

IMPORTANT BIRD AND BIODIVERSITY AREAS IN INDIA

Priority sites for Conservation

Revised and updated 2nd Edition Vol. I



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**Second Edition: Revised and Updated
Volume I**

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With major sponsorship from
Pavillion Foundation, Singapore

Recommended citation:

Rahmani, A.R., Islam, M.Z. and Kasambe, R.M. (2016) Important Bird and Biodiversity Areas in India: Priority Sites for Conservation (Revised and updated). Bombay Natural History Society, Indian Bird Conservation Network, Royal Society for the Protection of Birds and BirdLife International (U.K.). Pp. 1992 + xii

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Bombay Natural History Society in India is registered under Bombay Public Trust Act 1950: F244 (Bom) dated 06th July 1953.

ISBN: 978-93-84678-02-9

Cover Photographs: Design and collage by Gopi Naidu conceptualized by IBA Team.

First published: 2004 by IBCN: Bombay Natural History Society.

Second Revised Edition: 2016.

Printed by Akshata Arts Pvt Ltd. 22, A to Z Industrial Estate, G. Kadam Marg, Lower Parel, Mumbai 400 013. Published by the Bombay Natural History Society, Hornbill House, Shaheed Bhagat Singh Road, Mumbai 400 001.

Designed: V. Gopi Naidu.

Available from IBCN and BNHS website as given above.

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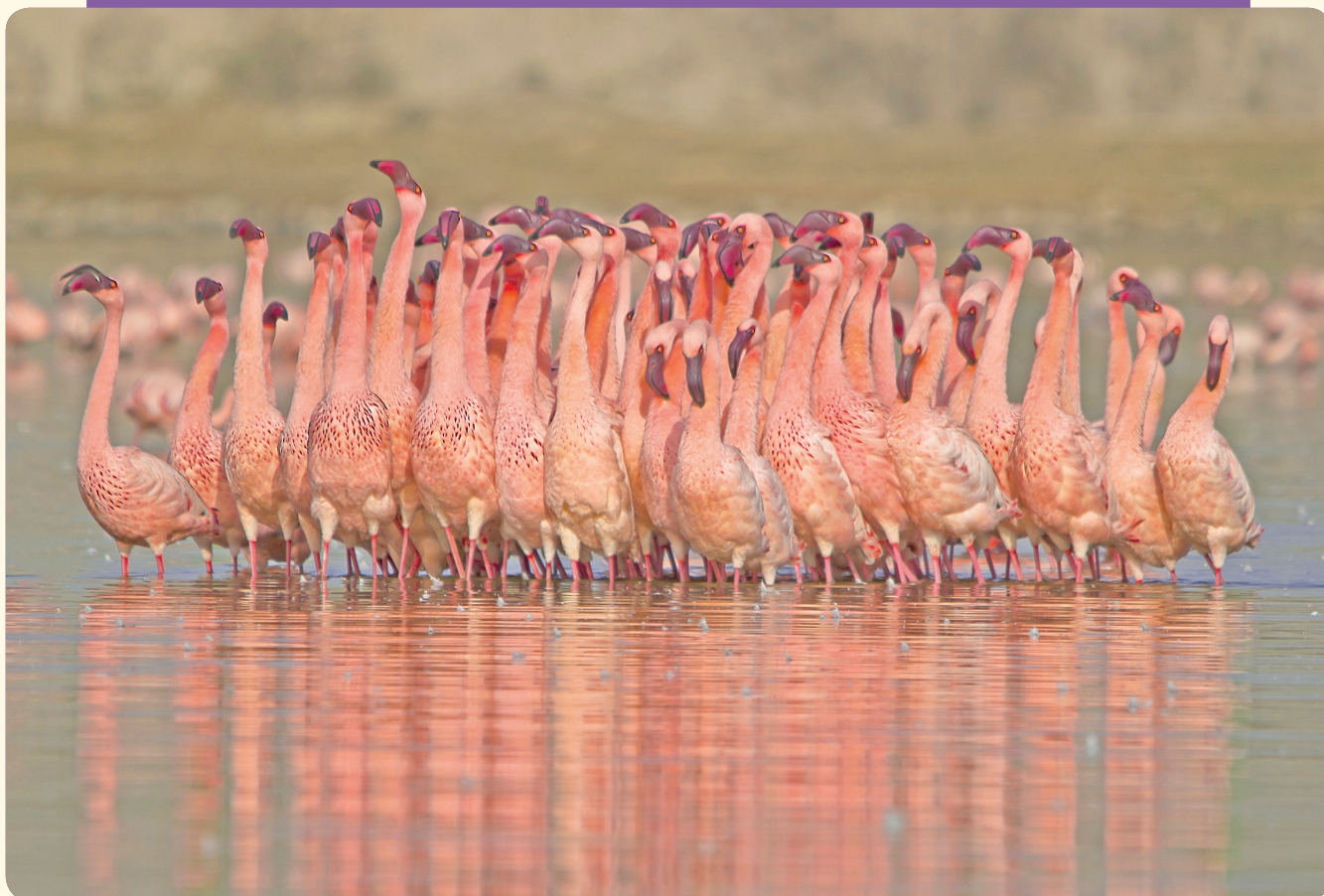
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GUJARAT

IN-GJ



Gujarat is the only state where both Greater Flamingo *Phoenicopeterus roseus* and Lesser Flamingo *P. minor* breed

Gujarat (20° 07'–24° 43' N and 68° 10'–74° 29' E) occupies the northern extremity of the western sea-board of India, sharing the international border with Pakistan on the northwest. It comprises three geographical regions: (i) The peninsula, traditionally known as Saurashtra, is essentially a plateau sprinkled with low hills; (ii) Kutch on the northeast is dry and rocky and contains the famous Rann (desert) of Kutch, the Greater Rann in the north and the Little Rann in the east; and, (iii) the mainland extending from the Rann of Kutch and Aravalli Hills to the River Damanganga is on the whole a plain level of alluvial soil. Gujarat has an area of 19.60 million ha, which constitutes 5.96% of the geographical area of the country (Mathew 2003). It is bounded by the Arabian Sea on the west, the Aravallis on the northeast, the Thar Desert on the north, the Vindhyas and the Satpuda Range on the east, and parts of the Western Ghats on the south. Its natural ecosystems range from marine and wetlands to deserts, grasslands and moist deciduous forests. Its coastline (1,650 km) with two gulfs, is the longest among the Indian states and shelters diverse coastal ecosystems such as mangroves, coral reefs, estuaries and mudflats. The plains of Gujarat are watered by four major rivers, the Sabarmati, Mahi, Narmada and Tapi. There are no major

rivers in the Saurashtra and Kutch regions.

Gujarat is also well known for its historical heritage. About 50 Harappan sites have been found in northern Gujarat. The state ranks first in India in the production of cotton and groundnut and second in tobacco. The chief food crops are paddy, wheat and bajra. Valsad is the first integrated horticulture district in India which has the largest export of vegetables, fruits and flowers from the country. Gujarat is a major salt-producing state and its production forms as much as 60% of the country's output.

The human population of the state is 6,04,39,692 (2011 census), with 65.51% living in rural areas. The population density is 310 persons per sq. km.

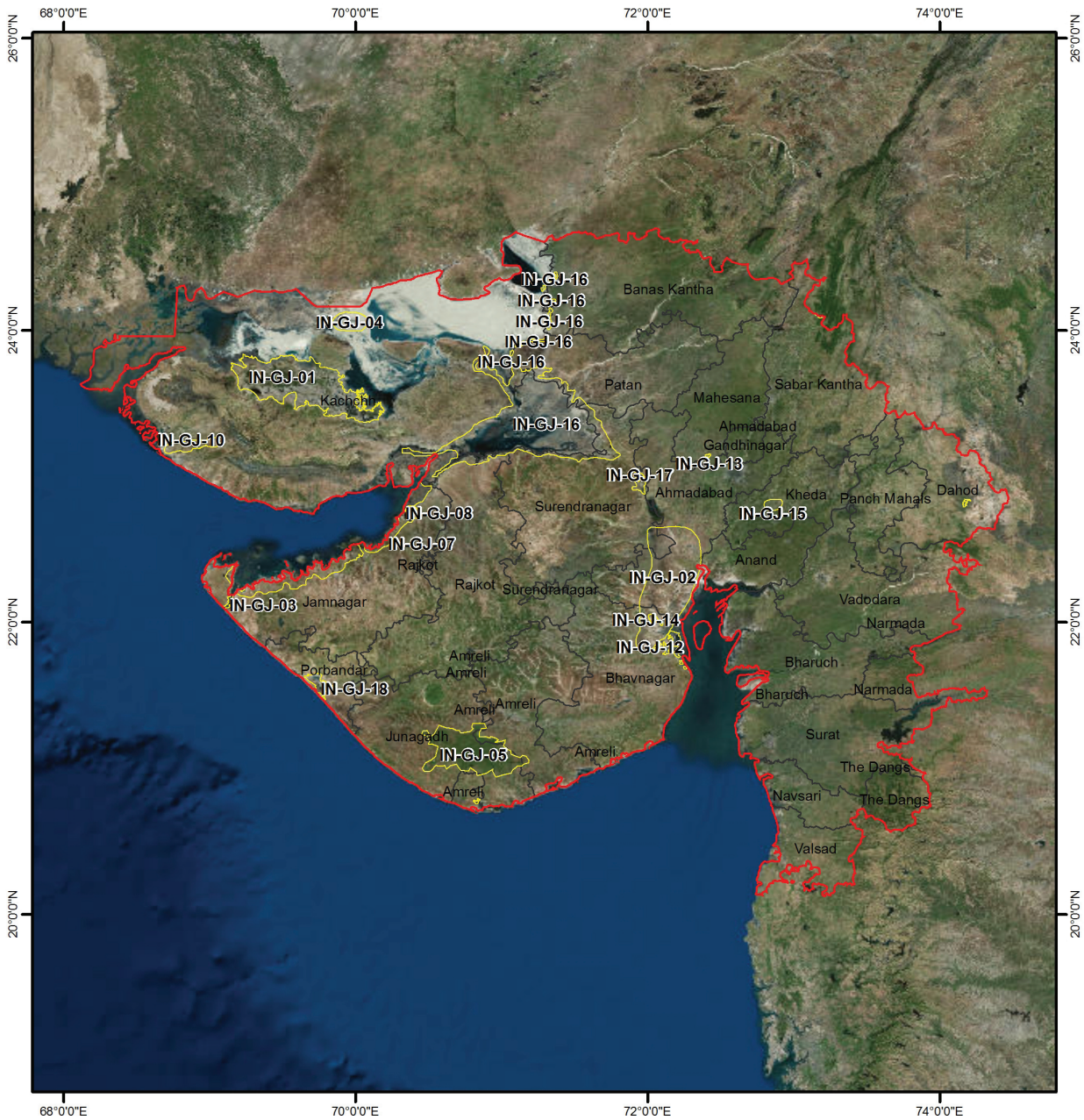
The average annual rainfall ranges between 400 to 1,000 mm and the mean temperature from 25° C to 27.5 °C. As the Tropic of Cancer passes through the northern border of Gujarat, the state has an intensely hot and cold climate. But the Arabian Sea and the Gulf of Cambay in the west and the forest-covered hills in the east soften the rigours of climatic extremes.

Vegetation

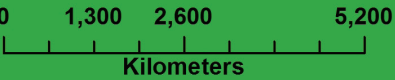
According to Forest Survey of India report of 1999, the

IN-GJ

Important Bird Areas in Gujarat











The 1,400 sq. km Gir is the largest tract of forest in Gujarat protected mainly for the Asiatic Lion.
But it is a good habitat for many bird species

forest cover of the state is 1.94 million ha which constitutes about 10% of the geographical area of the state. By legal status, Reserved Forest is 71.26%, Protected Forest 5.14% and Unclassed Forest 23.60%. The Forest Survey of India also states that based on satellite data of 1997, the forest cover is 12,965 sq. km which constitutes 6.61% of the geographical area. Dense forest, open forest and mangroves account for 6,430 sq. km, 5,504 sq. km and 1,031 sq. km respectively. This discrepancy is mainly due to three reasons: land is under the State Forest Department, but there is no forest left, some are as unclassified forest or grassland.

The main forest formations in the state are of teak, bamboo and mangroves (Champion and Seth 1968). There are four forest types, namely, Tropical Moist Deciduous, Tropical Dry Deciduous, Tropical Thorn, and Littoral and Swamp forests. The forests are mostly distributed in the southern part of Gujarat, whereas the middle and eastern parts bear bamboo forests of inferior quality.

Flora and Fauna

Owing to the presence of varied habitats, Gujarat harbours magnificent biodiversity. About 4,320 species of flora and 3,102 species of fauna have been reported from the state (Singh 2014). Of the 4,320 species of plants, 1,933 are species of algae, 164 fungi, 8 bryophytes, 16 pteridophytes, 1 gymnosperm and 2,198 angiosperms.

The animal species include 1,736 species of invertebrates. Among vertebrates, there are 606 species of fish, 22 amphibians, 114 reptiles, 513 birds and 111 mammals. Gujarat has 312 species of plants and 50 species of animals (vertebrates) in the list of globally Threatened category. Of these, more than 40 plants have been listed in the IUCN Red Data Book. According to Gujarat Ecology Commission and Zoological Survey of India (2000), 53 species of plants are either rare or endemic, of which the majority are found in Kutch.

Status of grasslands in the state: Grasslands, locally called *vidis*, are major habitats in Saurashtra and Kutch. Prior to Independence, majority of the *vidis* were private hunting or grazing grounds of the former Princely States. Before the advancement of agriculture in the region, most of the land was under grass cover, which was freely used by pastoralists and wildlife. A variety of birds, reptiles, antelopes and lesser carnivores enjoyed this tract in the past. The scenario changed during the second half of the last century. Invasion of *Prosopis juliflora (chilensis)*, expansion of agriculture, human habitation and industries brought major changes in land use pattern, making present development unsustainable.

Status of Asiatic Lion in Gujarat

Gir Forest in Gujarat is the last and only natural habitat

for more than 523 wild Asiatic Lions *Panthera leo persica* in the world. There are plans to re-introduce the species in Kuno-Palpur Wildlife Sanctuary in the neighbouring state of Madhya Pradesh to ensure their long-term survival against epidemics and natural calamities. Surveys were conducted in Kuno-Palpur Wildlife Sanctuary to assess whether the sanctuary has sufficient wild ungulates to support a population of lions (Johnsingh *et al.* 2007) and found that it can support many prides of lion. But the issue seems to be highly politicized and the real conservation of the species is being jeopardized. The issue is languishing in the court for many years now. Though Gujarat has a successful track record of conservation of Asiatic Lions, we need to be more realistic and scientific in the management of the threatened species. The Gujarat Government seems to be opposed to the idea of ‘sharing’ the uniqueness of Gujarat by translocating a few of the Asiatic Lions to Madhya Pradesh.

Status of the Indian Wild Ass

Like the Asiatic Lion, the Indian Wild Ass *Equus hemionus khur* globally has a single population in the Little Rann of Kutch. During the last century, the Indian Wild Ass had a fairly wide distribution in the dry regions of northwest India and Pakistan. Gradually, this animal disappeared from most of its previous habitat, except the Rann of Kutch. Dr Salim Ali (1946) estimated a population between 3,000 to 4,000 Asiatic Wild Ass in the Rann. The number and distribution range of the animal declined subsequently. Outbreak of Surra disease in 1960, caused by *Trypanosoma evansi*, also caused the decline of Wild Ass population.

As a result, only about 870 individuals survived in 1962. Subsequently, the attack of South African Horse Sickness in 1963 caused the death of some animals. As a result, only 362 animals were counted in the entire distribution range in 1969 by an aerial survey. Conservation measures started in the late 1970s, after the declaration of the sanctuary. Habitat protection and improvement works, including creation of water facilities for the wildlife, were carried out. Wild Ass responded to the conservation measures. Their numbers increased consistently from 720 in 1976 to 4,040 in 2008. The species has not only survived extinction but also seen an impressive recovery during the last three and a half decades since the declaration of the sanctuary. The number has increased by over five times since its first counting after the notification of the sanctuary (Singh 2014).

IBAS AND PROTECTED AREA

There are four national parks and 22 wildlife sanctuaries covering an area of 479.67 sq.km and 16440.91 sq.km respectively, totaling 1.69 million ha and constituting 8.62% of the geographical area. The maximum number of PAs are in the forest ecosystem (13), followed by wetland and grassland (4 each), desert and coastal ecosystem (2 each). Not all protected areas are recognized as IBAs. In 2004, 17 IBAs were recognized. Two new IBAs have been identified and added in this book: Curly-Gosabora, and Nikol to Samadhiyala coastal belt.

There are 12 sites in Gujarat which qualify the Ramsar criteria and are proposed as Ramsar sites (Islam and Rahmani 2008). These are Banni Grassland and Chhari

IBAs of Gujarat		
IBA site codes	IBA site names	IBA criteria
IN-GJ-01	Banni Grassland and Chhari Dhand	A1, A4i, A4iii
IN-GJ-02	Bhal Area	A1
IN-GJ-03	Charakla Saltworks	A1, A4i, A4iii
IN-GJ-04	Flamingo City	A1, A4i, A4iii
IN-GJ-05	Gir National Park and Wildlife Sanctuary	A1, A3
IN-GJ-06	Kaj Lake (Pipalava Bhandharo)	A1, A4i
IN-GJ-07	Khijadia Bird Sanctuary	A1, A4i, A4iii
IN-GJ-08	Marine National Park and Wildlife Sanctuary	A1, A4i, A4iii, A4iv
IN-GJ-09	Nalsarovar Wildlife Sanctuary	A1, A4i, A4iii, A4iv
IN-GJ-10	Naliya Grassland (Wildlife Kutch Bustard Sanctuary)	A1
IN-GJ-11	Rampura Grassland	A1
IN-GJ-12	Salt Pans of Bhavnagar	A1, A4iii
IN-GJ-13	Thol Lake Bird Sanctuary	A1, A4i, A4iii
IN-GJ-14	Velavadar National Park	A1, A4ii
IN-GJ-15	Wetlands of Kheda	A1, A4ii
IN-GJ-16	Wild Ass Wildlife Sanctuary & Nanda Island	A1, A3, A4i, A4iii
IN-GJ-17	Bhaskarapra wetland	A1, A4iii
IN-GJ-18	Gosabara (Mokarsar) Wetland Complex	A1, A4iii
IN-GJ-19	Nikol-Samadhiyala-Malan Wetlands Complex	A1, A4iii



ASIF N. KHAN

Indian Wild Ass *Equus hemionus khur* is only found in the Little and Great Rann of Kutch, with stray records from adjoining areas of Rajasthan. The Government of Gujarat has done commendable work in protecting this species

Dhand, Bhaskarpura, Charkla Salt Pans, Flamingo City, Kaj Lake, Khijadia Wildlife Sanctuary, Marine National Park and Wildlife Sanctuary, Nalsarovar Bird Sanctuary, Salt Pans of Bhavnagar, Thol Lake Wildlife Sanctuary, Wetlands of Kheda/Anand and Little Rann of Kutch Sanctuary. All of these are also IBAs. Only one site, namely, Nalsarovar was designated as a Ramsar Site on September 24, 2012 in Gujarat. It is a wetland of national importance, covering an area of 18,400 ha. (Rodgers *et al.* 2000).

AVIFAUNA

The bird life of Gujarat is very rich with more than 490 species identified till now, including some stray and unconfirmed records (Grimmett *et al.* 2011). For certain species, both common and rare, conservation is extremely important in Gujarat. The chief among these are Greater Flamingo *Phoenicopterus roseus*, Lesser Flamingo *P. minor*, Dalmatian Pelican *Pelecanus crispus*, Great White Pelican *P. onocrotalus*, Common Crane *Grus grus*, Demoiselle Crane *G. virgo*, Sarus Crane *G. antigone*, Great Indian Bustard *Ardeotis nigriceps*, Lesser Florican *Sypheotides indicus*, Sociable Plover *Vanellus gregarius*, Grey Hypocolius *Hypocolius ampelinus*, White-browed Bushchat or Stoliczka's Bushchat *Saxicola macrorhynchus*, harriers (*Circus* spp.) and many other raptors.

The Great White Pelican, a winter visitor in north India, occasionally breeds in the Great Rann of Kutch (Ali and Ripley 1987, Grimmett *et al.* 1998). The Dalmatian Pelican

can be seen in the Little Rann of Kutch (Zainabad), Wild Ass Wildlife Sanctuary (Shah *et al.* 1995), Chhari-Dhand (Tiwari 1997), Thol Lake Sanctuary, Nalsarovar Wildlife Sanctuary (up to 100 individual) (Scott 1989), Kheda, Gulf of Kutch, and Khijadia Wildlife Sanctuary.

For the two migratory species of cranes, Common and Demoiselle, Gujarat can be considered as the number one state in India, both in numbers and in regularity and duration of the stay. The bulk of the population of Common Crane winters in Gujarat, especially in the Banni region of Kutch where Tiwari and Rahmani (2002) estimate that up to 40,000 winter. The total wintering population could be as high as 70,000 individuals. The Demoiselle Crane is mainly found in the Saurashtra region. It is difficult to estimate the wintering population of the Demoiselle Cranes as they are found in a large area, with great local movement. But their number is more than the Common Crane by a factor of 3 or 4.

The grasslands of the Velavadar National Park (IBA) and the surrounding areas host the largest known harrier roost in the world (Clarke 1993) with about 4,000 individuals of four harrier species: Western Marsh *Circus aeruginosus*, Montagu's *C. pygargus*, Hen *C. cyaneus*, and Pallid *C. macrourus*. Besides the Velavadar grasslands, smaller harrier roosts are found in numerous grass *bheeds* scattered all over Saurashtra. Their total number is not known. Unfortunately, due to land use changes, the population of harriers has gone down drastically and now not more than a few hundred roost in Velavadar.

The Sociable Plover *Vanellus gregarius* is a globally Threatened species that has undergone rapid population decline, for largely unknown reasons (BirdLife International 2014). In India, it is a winter visitor (Ali and Ripley 1987, Grimmett *et al.* 1998), mainly to the north and west of the country. There are very few recent records (mainly from Rajasthan and Haryana: Rahmani 2012, BirdLife International 2014). In the winter of 1998, after a gap of nearly 50 years, 39 birds were seen in the fallow fields and grasslands of Naliya-Vengaber, Banni, Mandvi and Lala in Kutch (J. Joshua *in litt.* 2003).

The desert of Gujarat, represented by the Little and Great Rann, is a unique ecosystem, not found elsewhere in India. It consists of vast, flat, sun-baked land, punctuated by raised rocky outcrops called *bets*. These *bets* have xerophytic vegetation consisting of *Acacia*, *Zizyphus*, etc. Seasonal inundation by sea water and rain water, coupled with a high salt content of the soil provide a rare and unique type of ecosystem. When the right conditions are present, very large numbers of flamingos breed in the Great Rann. Most of the Little Rann is covered by invasive *Prosopis chilensis*. However, this provides good foraging and hiding places for migratory Macqueen's or Houbara Bustard *Chlamydotis macqueeni*. In the thorn forest of Banni, the Grey Hypocolius *Hypocolius*

ampelinus is a regular winter visitor/passage migrant in small flocks, mainly feeding on the berries of *Salvadora persica* (Tiwari *et al.* 1996). The wetlands of Bhavnagar, Kheda, Mehsana and Ahmedabad are important breeding ground for the Sarus Crane. In Kheda district alone, Mukherjee *et al.* (2002) have estimated more than 950 individuals.

There are five sanctuaries created for bird protection. They are Nalsarovar, Thol, Porbandar (Check), Lala and Khijadia. Except for Porbandar, all others fulfill IBA criteria. The Khajidia Bird Sanctuary in Jamnagar is unique in having freshwater and brackish waters side by side, divided by only a narrow bund. From one spot, one can see both the ecosystems with their own bird life. Nalsarovar (8000 ha) is one of the largest bird sanctuaries of the country, surpassed only by the Keoladeo National Park in Rajasthan and Chilika in Orissa in the number and diversity of birds. According to figures provided by the Forest Department, up to 1,46,000 birds were estimated in 1996 in Nalsarovar (Singh 1998).

The 1,40,000 ha Gir National Park and Gir Wildlife Sanctuary is the largest compact forest block in Gujarat, and perhaps the largest Dry Deciduous and Thorn Forest left in northwest India. Besides its famous denizen, the Asiatic Lion, it has nearly 300 species of birds. The Indian Grey Hornbill



ASAD R. RAHMANI

Vast area in Saurashtra is under Bt. cotton fields. Many former grasslands, called *bheed* or *veeds* in Gujarat, have been converted in to crop fields

LIST OF THREATENED BIRDS WITH IBA SITE CODES	
CRITICALLY ENDANGERED	
White-rumped Vulture <i>Gyps bengalensis</i>	IN-GJ-01, 03, 05, 09, 11, 12, 13, 14, 16, 17, 19
Indian Vulture <i>Gyps indicus</i>	IN-GJ-01, 05, 11, 13, 14, 16, 19
Red-headed Vulture <i>Aegypius calvus</i>	IN-GJ-01, 05, 07, 16, 19
Great Indian Bustard <i>Ardeotis nigriceps</i>	IN-GJ-01, 10
Baer's Pochard <i>Aythya baeri</i>	IN-GJ-05, 07
Sociable Plover <i>Vanellus gregarius</i>	IN-GJ-04, 10
ENDANGERED	
Lesser Florican <i>Sypheotides indica</i>	IN-GJ-01, 02, 05, 10, 11, 14, 16
Egyptian Vulture <i>Neophron percnpoturu</i>	IN-GJ-01, 02, 05, 07, 09, 14, 16
Saker Falcon <i>Falco cherrug cherrug</i>	IN-GJ-05, 12, 18
Black-bellied Tern <i>Sterna acuticauda</i>	IN-GJ-07, 09, 13, 18, 19
VULNERABLE	
Dalmatian Pelican <i>Pelecanus crispus</i>	IN-GJ-01, 03, 04, 05, 06, 07, 08, 09, 12, 13, 14, 16, 17, 18
Asian Wollyneck <i>Ciconia episcopus</i>	IN-GJ-05, 09, 14, 15, 17, 18
Lesser Adjutant <i>Leptoptilos javanicus</i>	IN-GJ-14
Marbled Duck <i>Marmaronetta angustirostris</i>	IN-GJ-01, 09
Pallas's Fish-eagle <i>Haliaeetus leucoryphus</i>	IN-GJ-07, 09
Indian Spotted Eagle <i>Clanga hastata</i>	IN-GJ-18
Greater Spotted Eagle <i>Clanga clanga</i>	IN-GJ-01, 02, 04, 05, 06, 07, 08, 09, 13, 14, 15, 16, 18
Eastern Imperial Eagle <i>Aquila heliaca</i>	IN-GJ-01, 02, 04, 05, 06, 07, 09, 10, 12, 14, 16
Sarus Crane <i>Grus antigone</i>	IN-GJ-01, 02, 05, 07, 09, 11,13, 14, 15, 16, 17, 18
Macqueen's Bustard <i>Chlamydotis macqueeni</i>	IN-GJ-01, 02, 10, 14, 16, 18
Indian Skimmer <i>Rynchops albigollis</i>	IN-GJ-01, 04, 05, 07, 08, 09, 12, 13, 15, 16, 17
White-naped Tit <i>Parus nuchalis</i>	IN-GJ-01, 16
White-browed Bushchat <i>Saxicola macrorhynchus</i>	IN-GJ-02, 10, 14, 16
Great Knot <i>Calidris tenuirostris</i>	IN-GJ-07, 08
NEAR THREATENED	
Spot-billed Pelican <i>Pelecanus philippensis</i>	IN-GJ-05, 08, 16
Oriental Darter <i>Anhinga melanogaster</i>	IN-GJ-01, 02, 03, 07, 08, 09, 12, 13, 14, 16, 17, 18, 19
Painted Stork <i>Mycteria leucocephala</i>	IN-GJ-01, 02, 03, 06, 07, 08, 09,11, 12, 13, 14, 15, 16, 17, 18, 19
Black-necked Stork <i>Ephippiorhynchus asiaticus</i>	IN-GJ-01, 02, 03, 05, 06, 07, 08, 09, 10, 13, 16, 17, 18, 19
Black-headed Ibis <i>Threskiornis melanocephalus</i>	IN-GJ-01, 02, 03, 05, 07, 08, 09, 12, 13, 14, 15, 16, 17, 18, 19
Lesser Flamingo <i>Phoenicopterus minor</i>	IN-GJ-01, 02, 03, 05, 06, 07, 08, 09, 12, 13, 16, 17, 18, 19
'Western' Black-tailed Godwit <i>Limosa limosa</i>	IN-GJ-01, 02, 03, 05, 07, 08, 09, 12, 13, 14, 15, 16, 18, 19
Eurasian Curlew <i>Numenius arquata</i>	IN-GJ-01, 02, 03, 05, 07, 08, 09, 12, 14, 15, 16, 18,
Ferruginous Duck <i>Aythya nyroca</i>	IN-GJ-01, 02, 07, 09, 13, 16, 18
Cinereous Vulture <i>Aegypius monachus</i>	IN-GJ-01, 02, 05, 09, 16
Himalayan Vulture <i>Gyps himalayensis</i>	IN-GJ-19
Pallid Harrier <i>Circus macrourus</i>	IN-GJ-01, 02, 03, 05, 06, 07, 09, 11, 12, 14, 16, 18
Red-headed Falcon <i>Falco chicquera</i>	IN-GJ-05, 07, 18
Laggar Falcon <i>Falco jugger</i>	IN-GJ-12, 18
Great Thick-knee <i>Esacus recurvirostris</i>	IN-GJ-01, 02, 05, 07, 12, 13, 15
River Lapwing <i>Vanellus duvaucelii</i>	IN-GJ-01, 02
River Tern <i>Sterna aurantia</i>	IN-GJ-01, 02, 03, 05, 07, 09, 13, 15, 16, 18
Alexandrine Parakeet <i>Psittacula eupatria</i>	In most IBAs
European Roller <i>Coracias garrulus</i>	IN-GJ-01, 02, 05, 07, 12, 14, 16, 18

Ocyrceros birostris has been exterminated from Gir, possibly due to hunting by the tribals. Despite good protection during the last 50 years or so, it has not come back. So it is a good candidate for the reintroduction programme.

Besides the official bird and wildlife sanctuaries in Gujarat, there are large numbers of wetlands, grasslands and private areas where any sort of hunting or shooting

of birds is totally prohibited as most of the people are vegetarian and do not kill animals. For example, there are thriving colonies of Painted Stork *Mycteria leucocephala*, Black-headed Ibis *Threskiornis melanocephalus*, egrets, etc inside Bhavnagar town, Pariehj and Shilaj village (a suburb of western Ahmedabad) (Tatu and Amita 1998). The private Charakla Salt Pans of the Tata Chemical Company



GOBIND SAGAR BHARDWAJ

The Lesser Florican is an obligate grassland species but it is becoming increasingly difficult for the species to find its habitat as grasslands are either converted to crop fields or over-grazed. Not much has been done under the Bustards Recovery Plan of the Government of India

near Dwarka have some of the highest concentrations of waders on the northwest coast of India. It is especially famous for its breeding population of the Great Crested Grebe *Podiceps cristatus* and migratory Black-necked Grebe *Podiceps nigricollis*. Up to 1400 Black-necked Grebe have been counted (A. Jadhav, B. M. Parasharya and B. Rughani *in litt.* 2003).

Threatened species for which Gujarat is important

Great Indian Bustard *Ardeotis nigriceps* Critically Endangered

The Great Indian Bustard was once widespread on the Kathiawar Peninsula (Saurashtra and Kutch). It was found in all areas except Gir National Park, Girnar and Barda hills (Dharmakumarsinhji 1957). Now it is almost extinct in Saurashtra but 20–25 birds are found in the Naliya area in Kutch (Dutta *et al.* 2010).

Sociable Plover *Vanellus gregarius* Critically Endangered

In India, Rajasthan and Gujarat are the most important states for wintering of this bird, although sporadic records are available from other states. Gadhavi (2014) has compiled recent sighting records of Sociable Plover from Gujarat. J.K. Tiwari reported sightings of Sociable Plover from Banni for three consecutive years viz. 2008, 2009 and 2010 as thirty birds, sixty birds and twenty birds respectively (Kasambe 2011, Tiwari 2010). On November

9, 2013, two birds were reported by Amish Parekh and Veer Vaibhav Mishra from Banni, followed by 18 birds reported by Jyotsna Sethi by the end of December 2013. On 1 January 2014, a flock of 17 individuals was observed by Mohammad Mutwa. Tiwari had also reported a flock of 19 individuals during these days. In February birds were reported by various people, namely Mike Waters (17), Gadhavi (2), Dhaivat Andhariya and others.

Varu and Trivedi (2009) recorded two individuals at Rangmati Dam in Jamnagar District.

In December 2013, 11 Sociable Plover were observed by Nihar Mehta while 14 individuals were observed by Devesh Gadhvi near Chhari Dhandh. Later, on March 2, 2014, a single individual was observed by Mohammad Mutwa which was the last sighting of the season.

There are also records from other places in Gujarat. For example, Pravinsinh Vihol, DFO, Kutch West Division, had observed a flock of 12 individuals seen with some Pacific Golden-plovers *Pluvialis fulva* near Fulay-Bhitara road. Varu and Trivedi (2009) recorded two individuals during birding on Rangmati Dam in Jamnagar District. Kandarp Kathju sighted a flock of 19 birds on November 14, 2012 near Bol village, Ahmedabad District (Kathju 2010).

It was estimated that the maximum known population of Sociable Plover from four sites in north-west India, i.e., Little Rann of utch Great Rann of Kutch, Tal-Chhapar WLS and near Sanand in Ahmedabad district was around 200–210 birds (Kasambe 2011).



Whale Shark is the largest fish in the world. It is found on the Saurashtra coast, particularly in the Marine NP, an IBA

**White-rumped Vulture *Gyps bengalensis* and
Long-billed Vulture *Gyps indicus*
Critically Endangered**

Like in other parts of India, these two species have drastically declined during the last 20 years, mainly due to extensive use of diclofenac. Jethava (2005) recorded a large colony of White-rumped Vulture in Mahuva taluka of Bhavnagar district. Tatu *et al.* (2012) conducted a survey of the White-rumped Vulture and Long-billed Vulture in 26 districts of Gujarat in 2010. He estimated 793 White-rumped and 265 Long-billed Vultures.

**Macqueen's Bustard *Chlamydotis macqueeni*
Vulnerable**

An unknown number of Macqueen's Bustard winter in the Little and Great Rann of Kutch, and some birds, in the drier parts of Saurashtra (e.g. Jamnagar and Rajkot districts). The birds are regularly seen in the Little Rann of Kutch. For example, during the census of Macqueen's Bustard in 2008 in Little Rann of Kutch, 10 individuals were sighted (Vora *et al.* 2008).

**Lesser Florican *Sypheotides indicus*
Endangered**

It is difficult to estimate the breeding population of this Endangered species in Gujarat but perhaps half of the world's total population is found in the state. There are

numerous grasslands (*bheeds*), especially in Saurashtra where this bird is seen during the monsoon when it comes for breeding (Sankaran and Rahmani 1990, Sankaran 2000). Two of the most important areas are Velavadar National Park in Bhavnagar and Naliya Grasslands in Kutch. Between 35–40 male Lesser Floricans were found in Velavadar and up to 100 males were seen in the Naliya Grasslands in the monsoon of 2001 (R. Jadeja *pers. comm.* 2001). During a study conducted from June to October 2001, Gadhavi (2002) found 38 male and 16 female floricans in Blackbuck National Park, Gujarat. He also recorded five nests. It is found in Dahod, Bhavnagar, Amreli, Surendra Nagar and Kutch districts (Bhardwaj, *et al.* 2011).

**Sarus Crane *Grus antigone*
Vulnerable**

Gujarat is the third most important State as far as the global population of the Sarus Crane is concerned, the first being Uttar Pradesh and second Rajasthan. Ahmedabad, Anand, Baroda and Kheda are important districts for the Sarus Cranes. During All-India Sarus Crane Count in the year 2000, almost 30% of the cranes counted were from Gujarat. The recruitment rate of the Sarus has fallen to nearly half as compared to 1999 (Choudhury *et al.* 1999, Sunder *et al.* 2000). In Gujarat, 16 districts and 43 sites revealed 660 adults and 94 juveniles. Hunting of the Sarus was reported from the Kaneval Pond in Anand and the

Shala Pond in Kheda district. Pariehy wetland, an important habitat of the Sarus, is threatened by development activities, principally the construction of the Saurashtra pipeline. The majority of Sarus Cranes in Gujarat are concentrated in three or four wetlands, and these are in urgent need of protection (Sunder *et al.* 2000).

White-browed Bushchat *Saxicola macrorhyncha*
Vulnerable

This is a rare and local resident of the Indian subcontinent and is listed as globally Threatened, with an unknown number surviving in the drier parts of Saurashtra and Kutch. The White-browed Bushchat was earlier called Stoliczka's Whinchat, named after Ferdinand Stoliczka who first described it in 1872 from specimens collected at Rapar and Bhuj in Kutch district (Stoliczka 1872). Dharmakumarsinhji (1954) wrote that it was 'rarely met with except in the drier portions of Saurashtra'. Unfortunately, he neither mentions

where the species was seen, nor whether he saw it. Now, it has been recorded from three known sites (all IBAs): Velavadar NP (10 individuals in Bhavnagar district in 1993, Rahmani 1996), Naliya Grasslands (few individuals, R. Jadeja *pers. comm.* 2002), and near Zainabad in the Little Rann of Kutch (Otto Pfister *in litt.* 2002). It is widely, though patchily distributed in Gujarat (particularly Kutch district) and there are many recent records (Rahmani 2012). On January 11, 2010 a female was seen by Nikhil and Pamela Rasmussen near Chhari Dhand in the Banni area of Kutch (Rahmani 2012).

White-naped Tit *Parus nuchalis*
Vulnerable

Pied Tit or White-winged Black Tit or White-naped Tit is endemic to India and has a disjunct and restricted range: one in south India and another in northwest India (Ali and Ripley 1987, Grimmett *et al.* 1998). Hussain *et al.*



ASAD R. RAHMANI

Birds and other animals are generally not killed in Gujarat as a result of which one can see large nesting colonies inside bustling towns. It is not unusual to see pigeon-breeding centres in some villages. Villagers also provide food and water to birds



BHARAT RUGHANI

Most of the village wetlands are good habitats for birds. In winter millions of migratory waterbirds find refuge in wetlands and coasts of Gujarat

(1992) have described its recent distribution, and Tiwari and Rahmani (1996) have described its current status and biology in Kutch. It is difficult to estimate the total population but it is uncommon everywhere, mainly due to the paucity of a suitable habitat. The extant Tropical Thorn Forests of Kutch, Surendranagar and Mehsana districts are very important for its survival. In Narayan Sarovar Chinkara Sanctuary, Kutch, Joshua *et al.* (2007) saw a total of 16 individuals in seven of the 76 sub-grids they surveyed, mainly in large *Acacia*, *Prosopis* and *Salvadora* patches along dry river beds and *nullahs*. In the Jessore Sloth Bear Sanctuary, located in southern Aravali Hills in Banaskantha district, Trivedi conducted a study between July 2003 and February 2005 and saw 18 adult birds in 12 sightings chiefly in thorn scrub habitat. Another study by Kala *et al.* (2008) in southern Aravali Hills, north Gujarat, found 92 individuals.

Biomes

The following three biomes are found in Gujarat: Biome 10, Indian Peninsula Tropical Moist Forest; Biome11, Indo-Malayan Tropical Dry Zone; and, Biome 13, Saharo-Sindian Desert. In Dangs district, at the border of Gujarat and Maharashtra, the northernmost portion of Biome 10 (Western Ghats) is found. A closed canopy forest of trees of

30 m or more in height is found here. The dominant species here being mostly moist deciduous, though some evergreen dominants are also found (Singh 1998). A few evergreen trees are found in the lower storey, giving the forest as a whole an evergreen appearance for most of the year. The rainfall varies from 1,250 to 1,900 mm, with a 4–5 months dry season. BirdLife International (undated) has listed 15 species in Biome 10, out of which at least three species are found here, i.e. Indian Scimitar Babbler *Pomatorhinus horsfieldii*, Malabar Whistling-thrush *Myiophonus horsfieldii* and Black-throated Munia *Lonchura kelaarti*. One of the Western Ghats endemic, Small or Crimson-backed Sunbird *Leptocoma minima* is also found in northern Gujarat.

The major area of Gujarat is occupied by Biome11 (Indo-Malayan Tropical Dry Zone). This consists of Dry Deciduous Forest, Dry Evergreen Forests, Thorn Forest, Semi-Desert Scrub, Wooded Grasslands and abandoned crop fields. Many species of this biome have adapted to human-modified habitats. BirdLife International (undated) has listed 59 Indian species in this biome, out of which 52 species have been reported from Gujarat.

The third biome found in Gujarat is the Saharo-Sindian Desert (Biome 13), mainly located in the Kutch district (Great Rann), with some portions in Surendranagar, Banaskantha and Mehsana districts (Little Rann).

Eleven species are identified as representatives of this biome (BirdLife International, undated). Ten have been identified in Gujarat, including such Indian rarities as Grey Hypocolius (Tiwari *et al.* 1996). The remaining species are the Great Indian Bustard, Spotted Sandgrouse *Pterocles senegallus*, Greater Hoopoe-lark *Alaemon alaudipes*, Desert Lark *Ammomanes deserti*, Trumpeter Finch *Bucanetes githagineus*, Sykes's Nightjar *Caprimulgus mahrattensis*, White-eared Bulbul *Pycnonotus leucotis*, White-browed Bushchat and Rock Martin or Pale Crag-martin *Ptyonoprogne obsoleta*. The last species is reported as vagrant in this state.

Some species of Biome 5 (Eurasian High Montane), Biome 7 (Sino-Himalayan Temperate Forest) and Biome 12 (Indo-Gangetic Plains) have been reported, mainly as winter visitor.

The Sind Sparrow *Passer pyrrhonotus* mainly found in Pakistan and representing Secondary Area Indus Plains has been reported from Gujarat as uncommon winter visitor (Grimmett and Inskipp 2003).

THREATS AND CONSERVATION ISSUES

The most important threats to bird life and other life forms in Gujarat are from human and livestock population explosions, overgrazing, frequent droughts, water wars, rapid industrialisation and pollution, spread of invasive species and threats of denotification of protected areas. Most of these threats are common in other states also and are too well known to need elaboration. Nevertheless, some of them are described in the context of the IBAs of Gujarat.

Threats in Banni and Great Rann of Kutch Conversion of grassland to Saline Land

Since the last few years, Kutch has started receiving good rainfall; the threat of conversion of grassland into saline land, highlighted by Tiwari and Rahmani in 1997 cannot be ignored. The Rann to the north of Banni has been slowly encroaching into the Banni area. In the past, within a span of a decade, three villages named Udhma, Laiwara and Mota-Bhitara had been abandoned for this reason. During high tide, seawater from the Rann often spills into the Banni Basin and cannot drain back, as the grassland slopes southward. It stagnates and evaporates, leaving behind a salt layer. By this process the Rann has been encroaching into the grassland. Increase in salinity affects the growth of grasses (Gadhavi 2014).

Development of check-dams in rivers

Development of check-dams in the rivers that used to bring fresh water to Banni before merging into the Great Rann of Kutch has also impacted the ecology of Banni. Numerous dams have come up in recent decades, which have altered the water drainage of Banni completely. They

prevent leaching of saline soil, resulting in further increase in salinity, which adversely affects the growth of grasses (Gadhavi 2014).

Car Rally in Banni Grasslands

Unfortunately, a car rally (Desert Storm Rally) is being organised in the Banni region since the last few years. During this event, around 200 participants race their cars through the Banni area at very high speed of about 100 kmph. This activity disturbs the wildlife of the area a lot. As the area is under the Revenue Department, the Forest Department cannot control this activity. Such an activity, especially during winter, can cause immense disturbance to the migratory birds (including the Critically Endangered Sociable Plover). And it also increases the threat of collision with vehicles and the mortality of birds. Loss of even a single individual bird/animal enlisted as Critically Endangered species leaves a long-lasting effect.

Jurisdictional limitations of various departments

Despite the fact that the Banni area is an IBA and needs to be protected and conserved properly, only a small portion of the land is with the Forest Department. Major portion is either revenue land or community land; in such circumstances implementation of a policy for the betterment of wildlife becomes difficult. Inter departmental coordination and involvement of community in conservation activity is lacking in this area which puts a question mark on its future security (Gadhavi 2014).

Wildlife Tourism

It is a fact that tourism plays a key role in spreading awareness among people, and it also highlights the importance of an area. The Gujarat Government's initiative to promote eco-tourism through various activities is an appreciable step; and involvement of local communities in such business has made it more sensible and self-sustainable as well. But, the pressure from tourism also needs to be checked regularly and if required, it should be controlled. Excessive movement of tourist vehicles chasing a single flock of birds surely affects its routine activities. Currently it is not a major threat but in future it may require some policies for the safety of the birds (Gadhavi 2014). The Gujarat Government and FICCI has been organising the Global Bird Watchers Conference with the help of many NGOs, including Bombay Natural History Society, and has resulted in tremendous influx of bird tourists and bird photographers in Gujarat over the last few years.

Fire Incidents

Though it is not a major threat to the area, unregulated fire cannot be neglected. Many reasons are responsible for

fire outbreaks in Banni like carelessly discarded cigarette buds from moving vehicles, sporadic movement of honey-collectors who light fire while collecting honey sometimes resulting in serious fire incidents, and charcoal-making practice. In 2013, a serious fire broke out near Hajipir and Luna area, the reason being the honey-collectors. Banni, being a dry grassland area, is highly susceptible to fires during most part of the year. Even a small fire can end up in a dramatic loss of habitat if action is not taken immediately.

Threats in Little Rann of Kutch

Production of salt in an age-old activity and thousands of people depend on the salt-making business in and around the Little Rann of Kutch, but this business has grown and expanded, jeopardizing the habitat of many species. Besides the salt pans, vehicular movement causes tremendous disturbance. Some salt workers have settlements near the salt-pans within the Wild Ass Sanctuary area. They keep dogs for safety and security purpose, but many dogs have become free-ranging and they move all over the place, hunting wildlife (Gadhavi 2014).

Excessive Use of Pesticides

According to Devesh Gadhavi (2014) on the fringe and surrounding areas of Little Rann of Kutch there are many agriculture fields. Birds such as Ruff (male) and Reeve (female) *Philomachus pugnax*, cranes, Sociable Plovers,

larks and pipits visit such agriculture fields for foraging. Many a time Sociable Plover has been observed in the cumin or wheat fields. Use of pesticides is unregulated. The impact of these persistent organic pesticides on birds is not known. This needs to be studied and remedial measures taken.

Narmada Canal

It has been observed that the development of Indira Gandhi Canal Project has altered the crop pattern of the area in Rajasthan. It has indirectly affected the wildlife of the area. Development of Narmada Canal which is passing through the Wild Ass Sanctuary at certain points will certainly change the crop pattern of this region and may adversely affect the overall landscape ecology of Little Rann of Kutch.

Invasive species *Prosopis* in Banni

One of the greatest dangers to indigenous fauna is the spread of Mesquite *Prosopis chilensis*. It is now the main problem in the Wild Ass Sanctuary in the Little Rann and in the proposed Chhari Dhand Waterfowl Sanctuary in Banni. The 3,847 sq. km Banni Grassland is now invaded by this invasive species (Tiwari and Rahmani 1999). Though it has lost much of its greenery, the Banni still sustains a population of 30,000 milch cattle and 25,000 sheep and goats. The livestock avoid the leaves of *P. chilensis*, which seem to contain some toxic substance. Eating its seedpods



ASAD R. RAHMANI

Open-cast mining is a major conservation issue in Gujarat, particularly in Kutch district

can dislocate a cow's jaw, thus reducing grazing efficiency. As the tree has spread, the comparatively hardier buffaloes have replaced the once common and more productive cows of the Kankrej breed. The cows are more susceptible to wounds caused by the thorns of this weed. Traditional water storage systems are also threatened by this weed (Tiware and Rahmani 1999). The spread of this weed is believed to be a significant factor contributing to the decline of many grassland mammals such as Wild Ass *Equus hemionus*, Desert Fox *Vulpes vulpes* and Chinkara *Gazella bennetti*. Prominent among the birds found in Kutch are Houbara, Lesser Florican, King or Red-headed Vulture, Red-headed Falcon,

Steppe Eagle *Aquila nipalensis*, Eastern Imperial Eagle, and the Short-toed Eagle *Circaetus gallicus*. Some of them find it difficult to hunt in the dense thickets of *Prosopis chilensis*. However, at the same time, the spread and growth of *Prosopis* has reduced the cutting pressure on native trees as its wood is good fuel. It is also used for charcoal making (Tiware and Rahmani 1999). Invasion of *Prosopis chilensis* within the Sanctuary area and especially on the islands and fringe area is altering the habitats at a rapid rate. Uncontrolled grazing on such islands also contributes in seed dispersal of *Prosopis chilensis*. Germination of seeds from the dung of livestock has been observed.

Chemical industries and pollution

Most of the highly polluting Indian industries in the list of 18 identified by the Central Pollution Control Board (CPCB) can be found in Gujarat. The Labour Commissioner, Gujarat has listed 46 highly inflammable, poisonous, lethally toxic and hazardous chemicals being produced in Gujarat. The production of some of them is either banned or agreed to be phased out in the developing countries (Gujarat Ecology Commission 2011). Most of these polluting industries are set up in what is known as the golden corridor including Ahmedabad, Surat, Bharuch, Valsad, Vadodra and Mehsana districts. This is the area where the major rivers of Gujarat, the Sabarmati, Mahi, Narmada, Tapti and Damanganga flow. Another industrial belt is the Jamnagar and Rajkot area where giant petrochemical industries have come up in the recent years, threatening the existence of the Marine National Park.

Water wars

Gujarat is a dry state, especially the Saurashtra and Kutch regions. Rainfall is inadequate and erratic with periodic drought years. Water is a limiting factor and the reason for many disputes among stakeholders. About 87% of the municipal towns depend entirely on ground water resources (Gujarat Ecology Commission 2001). In the industrial belts, most ground water is polluted and unfit for any use, either for irrigation or for drinking. Despite the development of the Narmada irrigation project, large parts of

Saurashtra face water crises. In the coastal regions, due to excessive use of ground water, salinity ingress is becoming a major problem in the Bhavnagar-Una and Malia-Lakhpur stretches. It has affected an area of as much as 13,524 sq. km and reached 14 km inwards from the shore (Gujarat Ecology Commission 2001). In order to tap rainwater, Gujarat is dotted with small to medium size reservoirs, some more than 200 years old. These reservoirs attract a very large number of waterfowl, especially migratory cranes and ducks. One such large reservoir of 700 ha, established in 1912 near Thol village, is now a bird sanctuary and an IBA. Most of the water of the lake is drawn for irrigation, restricting the water spread to less than 10 ha during midwinter. Local villagers carry out cultivation within the sanctuary. Although the level of protection against poaching is good, there are difficulties in implementing the provision of the Wildlife (Protection) Act, 1972 because of historical use of water by local people as well as non-settlement of legal issues related to illegal cultivation, and withdrawal of water (Singh 1998).

Mining

One of the biggest conservation problems of Gujarat is mining, in and outside protected areas. The Narayan Sarovar Chinkara Sanctuary in Kutch was reduced from about 90,000 ha to 40,000 ha to allow mining. Another irreversible problem is denotification of PAs to allow mining, laying of pipelines, industrialisation, canal irrigation, etc.

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BANNI GRASSLAND & CHHARI DHAND

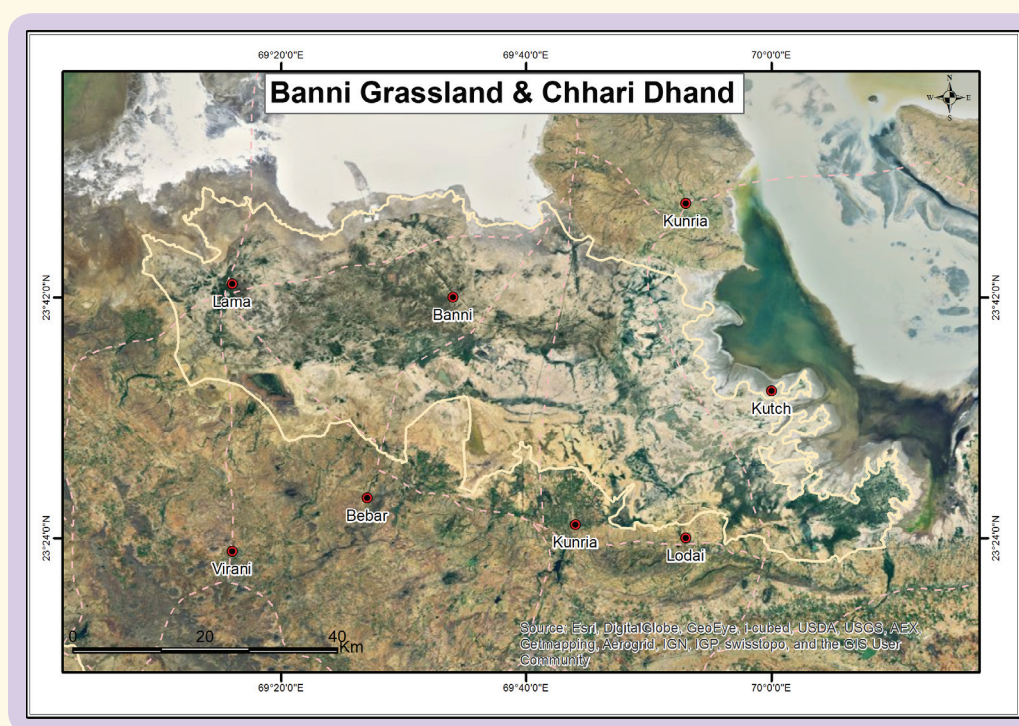
IN-GJ-01

IBA Site code	: IN-GJ-01
Administrative Region (State)	: Gujarat
District	: Kutch
Coordinates	: 23° 41' 60" N, 69° 24' 00" E
Ownership	: State
Area	: 384,700 ha

Altitude	: 2–5 msl
Rainfall	: 400 mm
Temperature	: 6 °C to 47 °C
Biogeographic Zone	: Desert
Habitat	: Tropical Grassland, Freshwater Swamp, Tropical Secondary Scrub

IBA CRITERIA: A1 (Threatened species), A4i ($\geq 1\%$ population threshold), A4iii ($\geq 20,000$ waterbirds)

PROTECTION STATUS: Not officially protected.



GENERAL DESCRIPTION

The Banni area, as the name signifies, is *bani hui* (made up) land formed by the detritus brought down and deposited predominantly by the Indus river, which was reported to flow through the Great Rann in the past. Banni is a low-lying alluvial plain. The local Sindhis call the grassland of Banni *peera jo paat* or the land of saints.

Banni is under the control of the Revenue Department and extends over two *talukas*, Nakhatrana and Bhuj. A small part of Banni grassland also lies in Lakhpat and Bhachau *talukas*. The state highway from Bhuj to Khavda divides this grassland into eastern Banni (also locally called Ugamni Banni or Nandhi Banni) and the main Banni. About 38% of the total area of the Banni used to be covered by superior grassland with 40 different varieties of grasses (Anon. 1992). Recently Yatin *et al.* (2012) surveyed Banni and recorded 49 herbaceous plant species used as fodder by livestock. Of these, 42 were grasses, one herb and six sedges.

A huge freshwater lake (c. 8,000 ha in good rains) locally known as Chhari Dhand (*dhand* = a shallow lake) is a prominent feature of Banni grassland. There are a number of seasonal waterbodies in Banni grassland (namely Servo Dhand, Vakeria Dhand, Kheerjog Dhand, Abdha Jheel, Mokar Jheel, Luna Jheel), filling up during years of heavy precipitation and with spillover from the nearby irrigation reservoirs, namely Bhukhi, Mathal, Nara, and Gajansar. The water gradually turns saline due to excessive evapotranspiration and the high content of dissolved salts in the soil. A huge concentration of waterfowl is hosted by these *dhands* during their autumn migration and in winter.

Vegetation includes c. 40 different species of grasses and sedges. *Prosopis chilensis*, which was introduced about 80 years ago, is the only dominant tree species. It now covers huge tracts of the grassland and forms impenetrable thickets in some places. *Acacia senegal* and *A. nilotica* are the other thorn forest species found along the fringes of Banni.

Islam & Rahmani (2008) proposed Chhari Dhand of Banni as a Ramsar site as it qualifies for Ramsar Criteria 2 (wetland supports threatened ecological communities), Criteria 5 (wetland regularly supports 20,000 or more waterbirds), and Criteria 6 (wetland regularly supports 1% of the individuals in a population of one species or subspecies). According to the Ramsar classification, Chhari Dhand can be considered as Type R (seasonal/intermittent brackish lake). This proposal was approved by the Gujarat Forest Department in January, 2013.

AVIFAUNA

About 270 bird species were reported from this site (Tiwari & Rahmani 1997). During years of good rainfall, Banni becomes the wintering ground for c. 40,000 Common Crane *Grus grus* (Tiwari & Rahmani 1997, 2002). The 1% threshold of Common Crane population wintering in India is 700 (Wetlands International 2012). Tiwari & Rahmani (1997, 2002) also estimated that about 70,000 Common Crane winter in the whole of Kutch district, especially after a normal monsoon. The total population of Common Crane in West Siberia/South Asia is c. 70,000 (Wetlands International 2012). This is the population that comes to India, Afghanistan, and Iran. Therefore, Kutch district, particularly Banni grasslands and Chhari Dhand, receive most of this population.

The globally Threatened Pied Tit or White-winged Black Tit *Parus nuchalis* (BirdLife International 2001), is found in the scrub forests at the edge of Banni (Tiwari & Rahmani 1996). Grey Hypocolius *Hypocolius ampelinus* is found in winter, almost every year, but its number fluctuates.

CRITICALLY ENDANGERED

White-rumped Vulture	<i>Gyps bengalensis</i>
Long-billed Vulture	<i>Gyps indicus</i>
Red-headed Vulture	<i>Aegypius calvus</i>
Great Indian Bustard (stray)	<i>Ardeotis nigriceps</i>

ENDANGERED

Lesser Florican (stray)	<i>Sypheotides indicus</i>
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VULNERABLE

Dalmatian Pelican	<i>Pelecanus crispus</i>
Marbled Teal	<i>Marmaronetta angustirostris</i>
Greater Spotted Eagle	<i>Clanga clanga</i>
Eastern Imperial Eagle	<i>Aquila heliaca</i>
Sarus Crane	<i>Grus antigone</i>
Maqueen's Bustard	<i>Chlamydotis macqueeni</i>
Indian Skimmer	<i>Rynchops albicollis</i>
Pied Tit	<i>Parus nuchalis</i>

NEAR THREATENED

Oriental Darter	<i>Anhinga melanogaster</i>
Painted Stork	<i>Mycteria leucocephala</i>
Black-necked Stork	<i>Ephippiorhynchus asiaticus</i>
Black-headed Ibis	<i>Threskiornis melanocephalus</i>
Lesser Flamingo	<i>Phoeniconaias minor</i>
Ferruginous Duck	<i>Aythya nyroca</i>
Cinereous Vulture	<i>Aegypius monachus</i>
Pallid Harrier	<i>Circus macrourus</i>
Great Thick-knee	<i>Esacus recurvirostris</i>
River Lapwing	<i>Vanellus duvaucelii</i>
Eurasian Curlew	<i>Numenius arquata</i>
Black-tailed Godwit	<i>Limosa limosa</i>
River Tern	<i>Sterna aurantia</i>
European Roller	<i>Coracias garrulus</i>



Grey Hypocolius *Hypocolius ampelinus* is one of the major attractions of this IBA as it is the only well known site in India where this bird is found in winter



DHIRTIMAN MUKHERJEE

Chhari Dhand, which spreads upto 80 sq. km after good rains, attracts more than 100,000 birds in some years. Nearly 40,000 Common Crane *Grus grus* are found in the Banni area

Earlier, the Great Indian Bustard *Ardeotis nigriceps* was regularly seen in Banni grasslands (Himmatsinhji, *pers. comm.* 1983) but now it is extremely rare. The last record is a male seen between Chhari Dhand and Khera Dungar, at the edge of Banni in 1991 (Mehboob Alam, *pers. comm.* 1991), and it has not been seen again.

The Indian Skimmer *Rynchops albigollis* is also listed as Threatened by BirdLife International (2001) due to its small, rapidly declining population as a result of widespread degradation and disturbance of lowland rivers and lakes. It has been described as resident, nomadic, and also local migrant, depending upon water conditions (Ali & Ripley 1987). The Indian Skimmer was not seen by Sálím Ali during his bird surveys in Kutch in 1943–1944 (Ali 1945). Interestingly, during the BNHS bird migration studies in Kutch in 1990–1991, it was observed at various wetlands, including one bird seen in Chhari Dhand on May 19, 1990 (Tiwari & Rahmani 1997).

Marbled Teal *Marmaronetta angustirostris* is listed as Vulnerable by BirdLife International (2001) due to its rapid decline in its core wintering areas because of widespread and extensive habitat destruction. It is essentially a European bird, and in India it is uncommon to rare. According to Wetlands International (2012), the non-breeding population numbers c. 5,000 in South Asia. Akhtar *et al.* (1992) saw c. 200 in February, 1990. This would be c. 4% of the South Asian population. Banni Grasslands and Chhari Dhand form one of the most important bird areas in the desert ecosystems of India. With the presence of 13 globally Threatened species,

and 14 Near Threatened species, it easily meets A4 criteria. With its huge numbers of ducks, waders, and cranes, many of them far exceeding their 1% population threshold, it also qualifies for A4i and A4iii criteria. Besides, the site also meets A3 criteria (biome-restricted assemblages). The site falls in Biome 13 (Saharo-Sindian Desert) but many species of Biome 11 are also found here. BirdLife International (undated) has listed 59 birds of Biome 11 in India. At this site, 24 have been seen and many more are likely to occur. Most of them are quite common and widespread.

Joshua *et al.* (2005) reported four Long-eared Owl *Asio otus* from Banni area. Nearly 25 years ago, vultures used to be extremely common, thanks to the large number of livestock and the resultant supply of carcasses, but now all species of vultures have become extremely rare. The Endangered Egyptian Vulture *Neophron percnopterus* is seen in the vicinity of villages, feeding on scraps and offal, but *Gyps* species are now almost gone. Similar is the fate of Red-headed Vulture *Aegypius calvus*, though its cousin the Cinereous Vulture *Aegypius monachus* is still fairly common in winter.

OTHER KEY FAUNA

The density of wild mammals is very low. Grey Wolf *Canis lupus*, Striped Hyaena *Hyaena hyaena*, Caracal *Caracal caracal*, and Chinkara *Gazella bennettii* are mainly seen. Nilgai *Boselaphus tragocamelus* is seen at the fringes and is increasing in number. Spiny-tailed Lizard *Uromastix hardwickii* is one of the commonest reptiles of Banni. In 2013, Rusty-spotted Cat *Prionailurus rubiginosus*, believed

to be the smallest wild cat in the world, was photographed by Vaibhav Mishra, a local naturalist.

LAND USE

- Agriculture
- Fishing
- Irrigation
- Human habitation
- Nature conservation and research

THREATS AND CONSERVATION ISSUES

- Siltation
- Overgrazing
- Invasion by exotic plant *Prosopis chilensis*
- Damming of rivulets
- Overspill of seawater on to the land

The Rann to the north of Banni has been slowly encroaching on the Banni area. In 10 years, three villages Udhma, Laiwara, and Mota-Bhitara have been abandoned for this reason. During high tide, sea water from the Rann often spills into the Banni Basin and cannot recede, as the grassland slopes southward. It stagnates and evaporates, leaving behind a salt layer. By this process the Rann has been encroaching on the grassland. Moreover, damming of north-flowing rivers, which used to empty into the Banni region before merging into the Great Rann of Kutch, has also impacted the ecology of Banni. Numerous dams have come up in recent decades, which have altered the drainage of Banni completely. They prevent leaching of saline soil, resulting in further increase in salinity, which adversely affects the growth of grasses (Tiwari & Rahmani 1997).

Considering the importance of Chhari Dhand, the Government of Gujarat is planning to declare it as a bird sanctuary. Banni and Chhari Dhand are used by local villagers, and once the sanctuary is declared, the management plan should be prepared in such a way that it does not unnecessarily impinge on the traditional rights of the locals.

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BHAL AREA

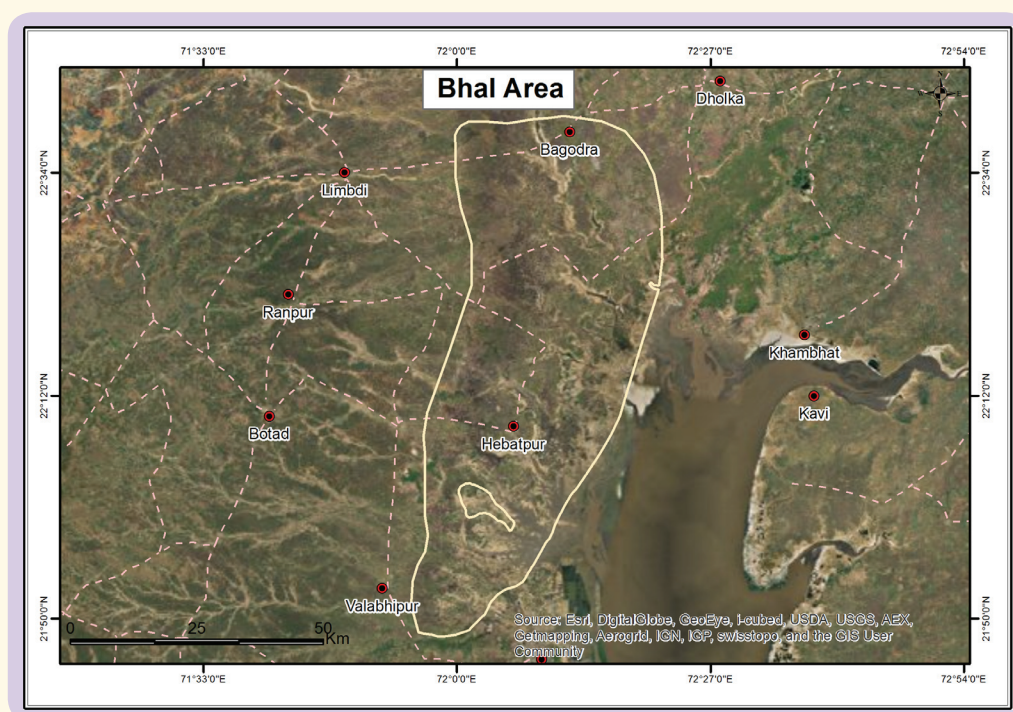
IN-GJ-02

IBA Site Code	: IN-GJ-02
Administrative Region (State)	: Gujarat
District	: Bhavnagar, Ahmedabad
Coordinates	: 22° 19' 59" N, 72° 00' 00" E
Ownership	: State
Area	: 259,000 ha

Altitude	: 0 msl
Rainfall	: 450 mm
Temperature	: 1 °C to 44 °C
Biogeographic Zone	: Coasts
Habitats	: Tropical Grassland, Tropical Moist Scrub

IBA CRITERIA: A1 (Threatened species)

PROTECTION STATUS: Not officially protected.



GENERAL DESCRIPTION

The Bhal (literally the forehead) is a flat alluvial plain, made up of a mosaic of croplands, saline wastelands, grasslands, pasture land, and marshes (Dharmakumarsinhji 1978). It is bordered on the south by the Kalubar river, extends north to Dholka and Dhandhuka, and northwest to Limbdi. The Bhal region is believed to have emerged from the sea during the late Tertiary and early Quaternary, much later than the rest of Saurashtra, which appeared during the Cretaceous period (Dharmakumarsinhji 1978, Raychaudhari *et al.* 1963).

The Bhal region is prone to droughts and floods. Cyclones occasionally strike the coast of Saurashtra. During such times, the Bhal becomes a large swamp. This attracts very large numbers of waders and other waterbirds.

This area was an open treeless habitat as recently as 50 years ago (Dharmakumarsinhji 1978, Mungall *et al.* 1981).

Prosopis chilensis was planted c. 60 years ago near Mithapur, to provide fuel wood. It has since become rampant and converted much of the grassland into savanna and thorn-forest habitat (Jhala 1991).

Nearly 40 species of grasses have been identified from the area. The dominant grass species are *Dicanthium annulatum*, *Sporobolus virginicus*, *S. coromandelianus*, and *S. maderaspatensis*. *Prosopis chilensis* is the dominant species of shrub.

AVIFAUNA

No detailed study of the avifauna has been conducted, and little published, except for notes by Dharmakumarsinhji and others. However, the scattered patches of grassland were perhaps the most important breeding areas for the Lesser Florican *Sypheotides indicus*, and even now they could become important inhabitants if protected during

the monsoon when grass comes up, which is their preferred habitat. Velavadar (another IBA), also in Bhal region, has well-protected grassland and between 40–45 male floricans are seen there.

Earlier about 25 years ago, *Gyps* vultures used to be extremely common, but now all species of vultures have become extremely rare. The Endangered Egyptian Vulture *Neophron percnopterus* is seen, but *Gyps* species are now almost gone. Similar is the fate of the Red-headed Vulture *Aegypius calvus*.

Bhal region is an important habitat of Stoliczka's or White-browed Bushchat *Saxicola macrorhynchus* (Gadhvi & Rathod 2003). It is seen in and around Velavadar NP, but is also likely to occur in more areas in Bhal.

Wherever standing water remains for a couple of months, Sarus Crane *Grus antigone* is likely to breed. No population estimate has been done, but after Kheda region in north Gujarat, Bhal area could be the most important habitat for this bird in Gujarat.

In winter, the Houbara or Macqueen's Bustard *Chlamydotis macqueeni* is found, albeit in small numbers. The Bhal region is also very important for raptors. Scattered grasslands and crop fields host a huge population of harriers. According to Asad Akhtar (*pers. comm.* 2001), 3,000–4,000 harriers roost in Velavadar NP. During the daytime, most of these harriers spread out in the Bhal region for foraging. Therefore, small grassland patches are extremely important for the survival of harriers.

During monsoon and till late winter, waterbodies are



DHIRTIMAN MUKHERJEE

The grasslands and wetlands attract very large numbers of birds such as harriers, larks, pipits, White Stork and raptors

formed that attract many waterbirds. Fourteen Near Threatened species have been identified from the Bhal area, out of which 10 are water-dependent.

ENDANGERED

Lesser Florican	<i>Sypheotides indicus</i>
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VULNERABLE

Greater Spotted Eagle	<i>Clanga clanga</i>
Eastern Imperial Eagle	<i>Aquila heliaca</i>
Sarus Crane	<i>Grus antigone</i>
Maqueen's Bustard	<i>Chlamydotis macqueeni</i>
White-browed Bushchat	<i>Saxicola macrorhynchus</i>

NEAR THREATENED

Oriental Darter	<i>Anhinga melanogaster</i>
Painted Stork	<i>Mycteria leucocephala</i>
Black-necked Stork	<i>Ephippiorhynchus asiaticus</i>
Black-headed Ibis	<i>Threskiornis melanocephalus</i>
Lesser Flamingo	<i>Phoeniconaias minor</i>
Ferruginous Duck	<i>Aythya nyroca</i>
Cinereous Vulture	<i>Aegypius monachus</i>
Pallid Harrier	<i>Circus macrourus</i>
Great Thick-knee	<i>Esacus recurvirostris</i>
River Lapwing	<i>Vanellus duvaucelii</i>
Eurasian Curlew	<i>Numenius arquata</i>
Black-tailed Godwit	<i>Limosa limosa</i>
River Tern	<i>Sterna aurantia</i>
European Roller	<i>Coracias garrulus</i>

OTHER KEY FAUNA

Nilgai or Blue Bull *Boselaphus tragocamelus* is very common, despite being a crop pest, as the local populace does not harm it. Chinkara *Gazella bennettii* is also seen, but only in undulating areas. Scattered herds of Blackbuck *Antelope cervicapra* are found, the majority of them in Velavadar NP. Grey Wolf *Canis lupus* is the largest wild predator of the region (Jhala 1991). Indian Fox *Vulpes bengalensis* and Golden Jackal *Canis aureus* are the smaller Canids of this area. Nearly 100 years ago, the vast flat grasslands of the Bhal used to have Cheetah *Acinonyx jubatus*. Once Cheetah became extinct here (and extremely rare in the rest of India), African Cheetahs were used for sport hunting. The Bhal is perhaps the last area in India where, up to the mid 1940s, tame African Cheetahs were used for hunting Blackbuck (Craighhead & Craighhead 2001).

LAND USE

- Human habitation
- Grazing land
- Salt pans and industries
- Traffic/transportation
- Agriculture



DHRTIMAN MUKHERJEE

Subspecies of *macqueeni* of Houbara *Chlamydotis undulata* has been upgraded to a full species known as Macqueen's Bustard *Chlamydotis macqueeni*. It is a winter visitor to India, mainly in Rajasthan and Kutch. Small numbers are seen in Bhal and other drier parts of Saurashtra

THREATS AND CONSERVATION ISSUES

- Destruction of grassland habitat due to increasing number of salt pans and industries
- Infestation by *Prosopis chilensis*
- Proposed Narmada Canal network
- Traffic
- Livestock grazing
- Industrial development and pollution

The increasing number of saltpans in Bhal poses a threat to the natural habitats of the avifauna. Beside this, industrial development in the coastal areas also disturbs the birds due to the resultant heavy traffic. Conversion of natural grassland into agricultural land is yet another threat that needs to be checked. Moreover, the spread of *Prosopis chilensis* is reducing the open foraging ground for Macqueen's Bustard and Stoliczka's Bushchat. The proposed Narmada Canal network will cause waterlogging and changes in land-use pattern, which will affect the wildlife of the area.

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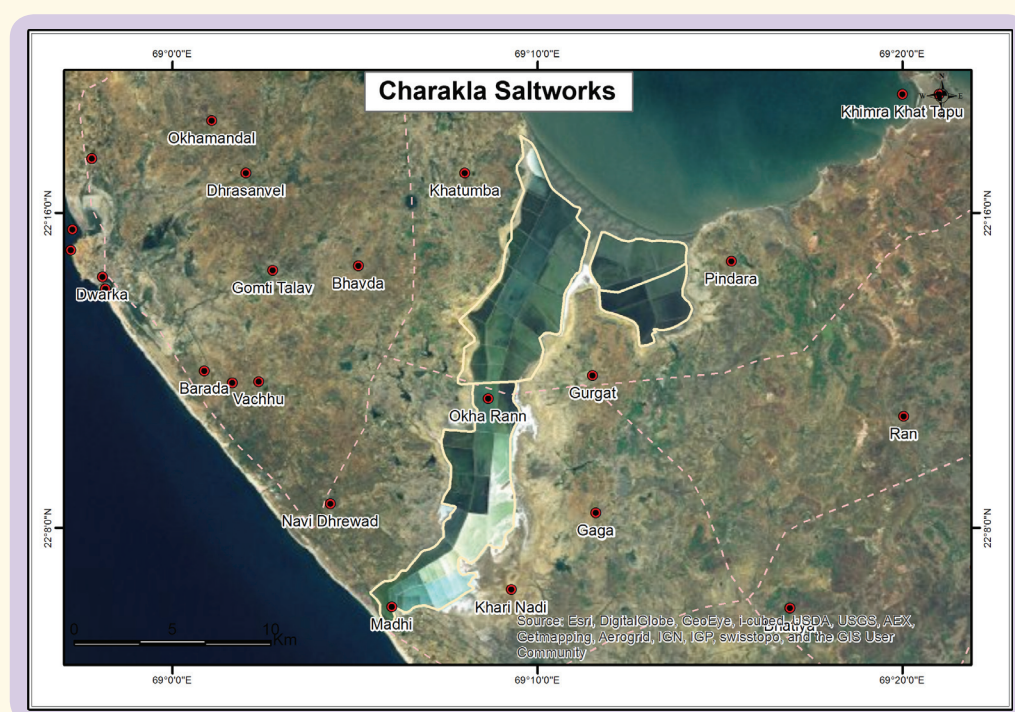
CHARAKLA SALTWORKS

IN-GJ-03

IBA Site Code	: IN-GJ-03	Altitude	: 0 msl
Administrative Region (State)	: Gujarat	Rainfall	: 800 mm
District	: Jamnagar	Temperature	: 10 °C to 45 °C
Coordinates	: 22° 16' N, 69° 10' E	Biogeographic Zone	: Coasts
Ownership	: Tata Chemicals Ltd	Habitats	: Aquatic (Salt Pan, Tidal Mudflat, Mangroves)
Area	: c. 6,000 ha		

IBA CRITERIA: A1 (Threatened species), A4i ($\geq 1\%$ of biogeographic population), A4iii ($\geq 20,000$ waterbirds)

PROTECTION STATUS: Not officially protected, privately owned.



GENERAL DESCRIPTION

The Charakla Saltworks are located near Okhamandal in Jamnagar district. The area is bounded by the Gulf of Kutch coastline on the north and spreads southwards to the Arabian Sea coastline. Sea water is pumped in from the Gulf of Kutch and allowed to flow through a series of shallow ponds to enable evaporation and the production of salt. These salt pans attract tens of thousands of waterbirds.

Islam & Rahmani (2008) proposed Charakla Salt Pans as a Ramsar Site as it qualifies for Ramsar Criteria 2 (wetland supports threatened ecological communities), Criteria 5 (wetland regularly supports 20,000 or more waterbirds), and Criteria 6 (wetland regularly supports 1% of the individuals in a population of one species or subspecies). According to the Ramsar classification, Charakla can be classified as Type H (salt pans).

The area features four types of habitats: salt pans,

mangroves, thorny scrub in the surrounding area, and saline wastelands.

AVIFAUNA

About 120 species of birds have been identified in this IBA (Vivek Talwar & Satish H. Trivedi, *pers. comm.* 2003). Earlier, there were reports of more than 300 Black-necked Grebe *Podiceps nigricollis* in some winters, but when Jadhav *et al.* (2005) conducted a survey from January 11–14, 2003, they counted 1,405 in the salt pans, perhaps the largest known population in India. The Great Crested Grebe *Podiceps cristatus* is known to breed in the area, and another confirmed site where this bird breeds is Khijadiya Bird Sanctuary in the same district.

Sometimes large flocks of up to 300–400 Rosy Pelican *Pelecanus onocrotalus* and Dalmatian Pelican *P. crispus* are seen. Both species of flamingos – the Greater *Phoenicopterus*



DHRITIMAN MUKHERJEE

Salt pans of Charakla under the control of Tata Chemicals Ltd are very well protected, hence a major attraction to thousands of waders such as stints, plovers, sandpipers, storks, egrets, gulls and terns. A few Eurasian Oystercatcher *Haematopus ostralegus* are also seen

CRITICALLY ENDANGERED

White-rumped Vulture *Gyps bengalensis*

NEAR THREATENED

Oriental Darter	<i>Anhinga melanogaster</i>
Painted Stork	<i>Mycteria leucocephala</i>
Black-necked Stork	<i>Ephippiorhynchus asiaticus</i>
Black-headed Ibis	<i>Threskiornis melanocephalus</i>
Lesser Flamingo	<i>Phoeniconaias minor</i>
Pallid Harrier	<i>Circus macrourus</i>
Eurasian Curlew	<i>Numenius arquata</i>
Black-tailed Godwit	<i>Limosa limosa</i>
River Tern	<i>Sterna aurantia</i>

roseus and the Lesser *Phoeniconaias minor* – are seen in thousands. Despite the presence of these spectacular birds, the site is more famous for its multitudinous flocks of smaller waders such as stints, sandpipers, plovers, curlews, and godwits. Some species occur in much greater numbers than their 1% population threshold determined by Wetlands International (2012). Small waders of 30 species are reported from this area – the list is too long to include here.

Among gulls, Herring *Larus argentatus*, Lesser Black-backed *L. fuscus*, Great Black-headed or Pallas's *Ichthyophaga ichthyophaga*, Brown-headed *Chroicocephalus brunnicephalus*, Black-headed *C. ridibundus*, and Slender-billed *C. genei* are found. Terns are represented by Sandwich *Thalasseus sandvicensis*, Graet Crested *T. bergii*, Little

Sternula albifrons, Saunder's *S. saundersi*, Gull-billed *Gelochelidon nilotica* and Caspian *Hydroprogne caspia*. The Caspian Tern breeds in this area (Sudarshan Rodriguez, pers. comm. 2004).

This site is selected on the basis of A1 (Threatened species), A4i ($\geq 1\%$ of biogeographic populations of many species), and A4iii (presence of $\geq 20,000$ waterbirds) criteria.

OTHER KEY FAUNA

There are not many large mammals, except for Blue Bull or Nilgai *Boselaphus tragocamelus*, Golden Jackal *Canis aureus*, Jungle Cat *Felis chaus*, and Small Indian Mongoose *Herpestes auropunctatus*.

LAND USE

The bulk of the area is under saltworks operations. Land on the sides of the salt pans has been kept fallow to facilitate drainage of storm water during the monsoon.

THREATS AND CONSERVATION ISSUES

- Fishing by local community
- Stray incidents of poaching
- Mortality of flamingos due to collision with power lines

The Okhamandal region is one of the most drought prone areas of India. Almost every alternate year is a drought year, resulting in scarcity of fodder. The locals resort to collection of mangrove foliage to feed their cattle. Camel grazing is also rampant in the mangrove zone. These anthropogenic pressures, including collection of fuel wood, have resulted in the degradation of the mangrove vegetation and added to the pressures on nesting birds.

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Vivek Talwar, Satish H. Trivedi.

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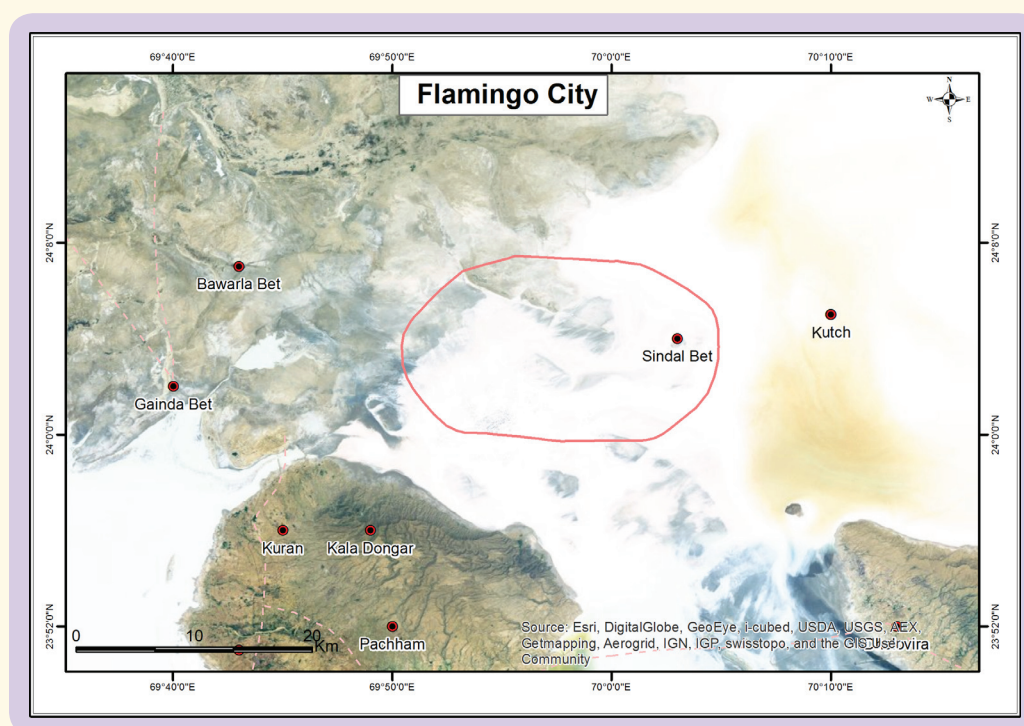
FLAMINGO CITY

IN-GJ-04

IBA Site code	: IN-GJ-04	Area	: 750,622 ha
Administrative Region (State)	: Gujarat	Altitude	: 0–438 msl
District	: Kutch	Rainfall	: 400 mm
Coordinates	: 24° 00' 00" N, 69° 52' 00" E	Temperature	: 1 °C to 48 °C
Ownership	: State	Biogeographic Zone	: Desert
		Habitat	: Aquatic (Seasonal Wetland)

IBA CRITERIA: A1 (Threatened species), A4iii (≥20,000 waterbirds)

PROTECTION STATUS: Protected as part of Kutch Desert Wildlife Sanctuary.



GENERAL DESCRIPTION

Flamingo City lies in the Rann of Kutch, 10 km northeast of Nir at the tip of Pachchham Island, south of Solanki Beyt. The area is famous for the nesting of Greater Flamingo *Phoenicopterus roseus* and Lesser Flamingo *Phoeniconaias minor*. Maharao Khengarji was the first to record the breeding of Greater Flamingo in India (see Shivraj Kumar *et al.* 1960) and later confirmed that they breed in large numbers in the so-called Flamingo City (Rao 1909). Ali (1945) estimated a total population in the order of half a million birds in 1945.

Flamingo City is now part of the Kutch Desert Wildlife Sanctuary (750,622 ha). The sanctuary is true saline desert habitat in low-lying flats, with an average altitude of 0.15 msl (Singh 1998). Kala Dungar is the highest point (438 m) within the sanctuary. The flat sterile land (called *rann*) becomes submerged during the rainy season. Flamingos

nest only when the water level is optimum (both due to good rainfall and ingress of sea water).

Other habitats of this sprawling sanctuary include the *beyts* or islands supporting vegetation, seasonal waterbodies, saline-alkaline scrub, *Prosopis* scrubland, desert thorn scrub forest in the hilly region Kala Dungar, and marsh vegetation (Singh 1998). Plant diversity is poor in this area. *Salvadora persica*, *S. oleoides*, *Capparis aphylla*, *C. decidua*, *Commiphora wightii*, *Ziziphus* sp., *Acacia senegal*, *Balanites* sp., *Euphorbia* sp., *Prosopis spicigera*, *P. chilensis*, *Aeluropus logopoides*, *Suaeda* sp., and *Cressa cretica* are the main species on the *beyts* and uplands (Singh 1998). The *rann* is more or less devoid of vegetation. Interestingly, a small patch of mangroves is found, c. 100 km inland, supported by the saline water (Ranjitsinh 1985).

Islam & Rahmani (2008) proposed Flamingo City as a Ramsar Site as it qualifies for Ramsar Criteria 2 (wetland

supports threatened ecological communities), Criteria 5 (wetland regularly supports 20,000 or more waterbirds), and Criteria 6 (wetland regularly supports 1% of the individuals in a population of one species or subspecies). According to the Ramsar classification, Flamingo City comes under Type R (seasonal/intermittent brackish lake).

AVIFAUNA

Flamingo City has been selected as an IBA based on its importance as a breeding ground of the Greater Flamingo *Phoenicopterus roseus* in India. More than 70,000 birds nest in an area of c. 100 ha (H.S. Singh, *pers. comm.* 2001). Besides the flamingoes, some globally Threatened species are also reported. This is the only known site in India where the Rosy Pelican *Pelecanus onocrotalus* has been found breeding (Ali 1960).

OTHER KEY FAUNA

The most famous mammal is the Asiatic Wild Ass *Equus hemionus*, found mainly at the junction of the Little Rann of Kutch with the Great Rann. Other species include Chinkara *Gazella bennettii*, Grey Wolf *Canis lupus*, and Caracal *Caracal caracal* (Singh 1998). Blue Bull *Boselaphus tragocamelus*, Wild Boar *Sus scrofa*, Striped Hyaena *Hyaena hyaena*, Desert Fox *Vulpes vulpes*, Civet Cat *Paradoxurus*

CRITICALLY ENDANGERED

Sociable Lapwing *Vanellus gregarius*

VULNERABLE

Greater Spotted Eagle *Clanga clanga*
 Eastern Imperial Eagle *Aquila heliaca*
 Indian Skimmer *Rynchops albicollis*
 Dalmatian Pelican *Pelecanus crispus*

hermaphroditus, Black-naped Hare *Lepus nigricollis*, Common Mongoose *Herpestes edwardsi*, and Porcupine *Hystrix indica* are also found in suitable habitats.

LAND USE

- Nature conservation and research
- Human habitation
- Indian Army

THREATS AND CONSERVATION ISSUES

- Unregulated tourism
- Army movement

Flamingo City is part of the large Kutch Desert Wildlife Sanctuary. Most of the desert area is not inhabited or used by people and appears to be protected, yet there is disturbance due to troop movement and other activities of the Indian Army. As Flamingo City has become quite popular with

IN-GJ-04



DHRITIMAN MUKHERJEE

This site Flamingo City has been selected as an IBA based on its importance as a breeding ground of the Greater Flamingo in India

the Army, any visiting dignitary is taken there, sometimes at the peak of the breeding season. Aerial sorties, to have a closer look, disturb the breeding birds. This could be easily avoided with greater sensitization and involvement of Army personnel. Otherwise, there appears to be no danger to this remote area.

Frequent drought and scarcity of water are the limiting factors on biodiversity. Being part of a large desert area, it is difficult to demarcate and manage the sanctuary properly. Final notification of the Kutch Desert Wildlife Sanctuary is still pending, mainly due to objection by the Army. As the sanctuary is close to the Indo-Pakistan border, it is of strategic importance to the Army. Therefore, involvement of the Army is absolutely essential for the protection of Flamingo City and the fragile desert ecosystem.

There is a proposal by the Indian Army to construct roads in Kutch Desert Wildlife Sanctuary, from Gaduli to Hajipur-Odma-Khavda-Kunaria-Dholavira-Maovanna-Gadakbet-Santalpur (Ranjitsinh *et al.* 2011). One of the proposed roads passes very close to Flamingo City. Due to the objection raised by members of the Standing Committee of the National Board for Wildlife (NBWL), the government agreed to a site inspection. In September 2011, a three-member expert team constituted by NBWL, after detailed inspection of the site, rejected the road proposal, particularly from Kunaria to Dholavira (31 km) as this is the only known breeding site of the flamingoes in India. Only 300 m of the road will be on hard ground in Tangdi Beyt – the main refuge of the Endangered Wild Ass during monsoon. The more problematic part is the 31 km long section that will be built on a raised embankment at least 3 m high, as this section passes through the Rann which remains submerged or muddy for almost six months a year. This section will run less than 6 km from the main Flamingo City. Disturbance by heavy army trucks will be just one of the disturbances,

to which the flamingoes may become accustomed, but the biggest danger will be the disruption of the flow of water. This long embankment, even with regular culverts, will disrupt the delicate water regime on which the breeding of the flamingo is dependent.

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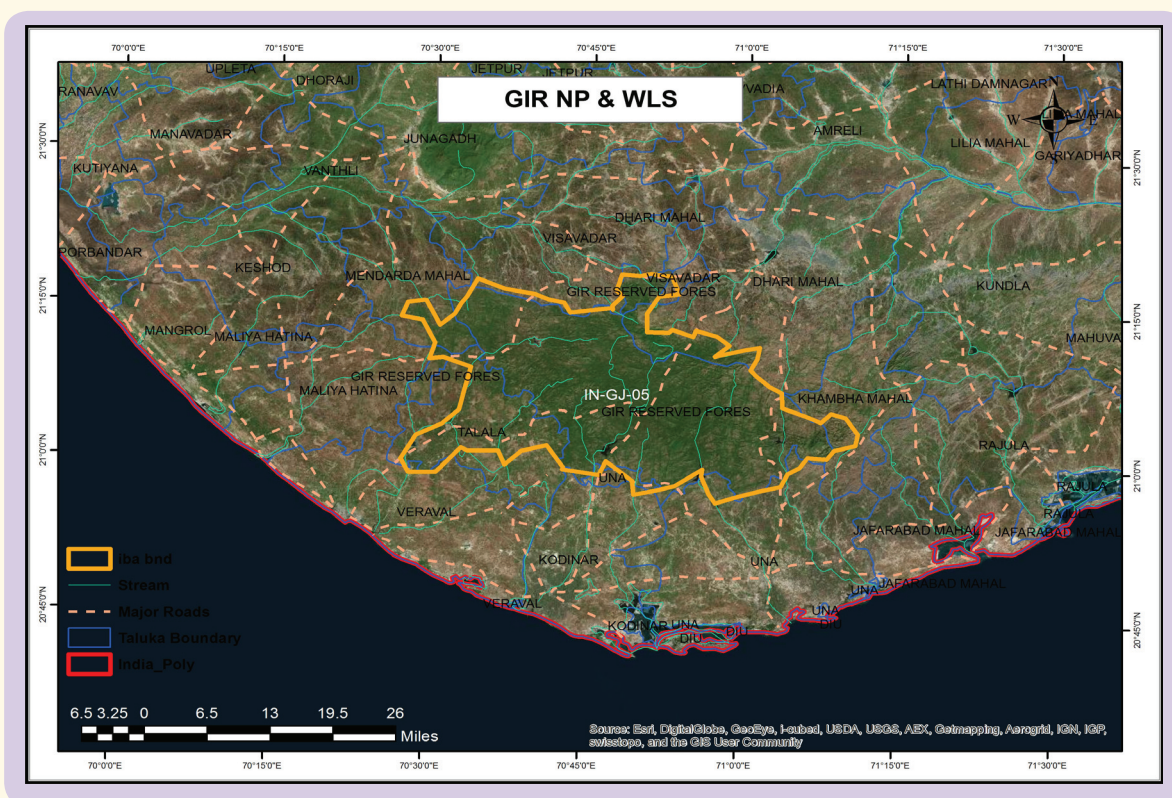
GIR NATIONAL PARK AND WILDLIFE SANCTUARY

IN-GJ-05

IBA Site code	: IN-GJ-05	Altitude	: 150–642 msl
Administrative Region (State)	: Gujarat	Rainfall	: 980 mm
District	: Junagadh, Amreli	Temperature	: 8 °C to 41°C
Coordinates	: 21° 17' 30" N, 70° 48' 45" E	Biogeographic Zone	: Semi-arid
Ownership	: State	Habitats	: Tropical Dry Deciduous Forest, Tropical Secondary Scrub, Tropical Grassland
Area	: 141,213 ha		

IBA CRITERIA: A1 (Threatened species), A3 (Biome 11 species)

PROTECTION STATUS: National Park, established May, 1975.



GENERAL DESCRIPTION

Gir National Park and Wildlife Sanctuary is one of the oldest protected areas of India and is famed for being the last remaining habitat of the Asiatic Lion *Panthera leo persica*. Gir forest has become a very stable ecosystem with tremendous regenerating, self-supporting, and self-sustaining capacity, due to its compactness and richness of biodiversity. It is one of the largest biologically intact continuous tracts of land in India reserved primarily for the conservation of its native wild fauna (Singh 1998, 2001). The site has undulating, low, hilly terrain, and is surrounded by flat agricultural land.

The total area is 141,213 ha, comprising a wildlife sanctuary (115,342 ha) and a national park (25,871 ha)

which it encircles. This area enjoys protection of the highest order. A 380 km stone wall borders the entire national park. The area forms the catchment for seven major and two minor rivers. There are four dams and seven perennial rivers within the protected area.

In all, 448 species of flowering plants and 96 tree species have been recorded in the area, including *Tectona grandis*, *Acacia catechuoides*, *Boswellia serrata*, *Butea monosperma*, *Lannea coromandelica*, *Anogeissus latifolia*, *Diospyros melanoxylon*, *Ficus glomerata*, and *Syzygium cumini* (Singh 1998).

AVIFAUNA

About 300 species of birds have been recorded from

DHRITIMAN MUKHERJEE



Kamaleshwar Dam in Gir attracts large numbers of birds and is a source of water during the hot summer months

Gir (Singh 1998). Globally Threatened species include Dalmatian Pelican *Pelecanus crispus*, Greater Spotted Eagle *Clanga clanga*, Indian Skimmer *Rynchops albicollis*, White-rumped Vulture *Gyps bengalensis*, and Long-billed Vulture *Gyps indicus*.

The wetlands in Gir support several waterfowl species, especially in Kamaleshwar Dam. The area has always been and continues to be popular with birdwatchers (Raol 1969).

Of the nine species of vultures in India, Gir has six. Two *Gyps* species have now become very rare. During a visit in 2001, not a single bird of these species was seen in two days (A.R. Rahmani, *pers. obs.* 2003). Red-headed Vulture *Aegypius calvus* was frequently seen and photographed on carcasses along with other vultures, but now it is extremely uncommon to find it in this sprawling IBA.

The Lesser Florican *Sypheotides indicus* is mainly seen in the surrounding grassland, very rarely inside Gir. Similarly, Sarus Crane *Grus antigone* is also found mainly in the surrounding areas.

In the whole of Saurashtra region, Gir is the largest tract of natural forests, and represents the best example of the original flora and fauna. Except for the Indian Grey Hornbill *Ocyrceros birostris*, which has become locally extinct due to persecution by tribals, most of the birds of the Indo-Malayan Tropical Dry Zone (Biome 11) are found in Gir.

Gir was selected as an IBA based on A1 (Threatened species) and A3 (Biome 11: Indo-Malayan Tropical Dry Zone).

OTHER KEY FAUNA

About 36 species of mammals, 300 birds, 33 reptiles, six amphibians, and 2,000 invertebrates have been reported from the area (Singh 1998). Besides the famous lions, Gir also supports a large population of the Leopard *Panthera pardus*. Important prey species include Spotted Deer *Axis axis*, Wild Boar *Sus scrofa*, Blue Bull *Boselaphus tragocamelus*, and Sambar *Rusa unicolor*, as well as domestic cattle. Other mammals include Four-horned Antelope *Tetracerus quadricornis*, Chinkara *Gazella bennettii*, Striped Hyaena *Hyaena hyaena*, Golden Jackal *Canis aureus*, Common Langur *Semnopithecus entellus*, Porcupine *Hystrix indica*, and Black-naped Hare *Lepus nigricollis*.

CRITICALLY ENDANGERED	
White-rumped Vulture	<i>Gyps bengalensis</i>
Long-billed Vulture	<i>Gyps indicus</i>
Red-headed Vulture	<i>Aegypius calvus</i>
ENDANGERED	
Egyptian Vulture	<i>Neophron percnopterus</i>
Saker Falcon (?)	<i>Falco cherrug</i>
Lesser Florican	<i>Sypheotides indicus</i>
VULNERABLE	
Dalmatian Pelican	<i>Pelecanus crispus</i>
Asian Woollyneck	<i>Ciconia episcopus</i>
Greater Spotted Eagle	<i>Clanga clanga</i>
Eastern Imperial Eagle	<i>Aquila heliaca</i>
Sarus Crane	<i>Grus antigone</i>
Indian Skimmer	<i>Rynchops albicollis</i>



ASIF KHAN

Asiatic Lion is an iconic animal and the pride of Gujarat and India. Thanks to excellent protection, nearly 100 lions now live outside Gir National Park and Wildlife Sanctuary

NEAR THREATENED

Spot-billed Pelican	<i>Pelecanus philippensis</i>
Ferruginous Duck	<i>Aythya nyroca</i>
Painted Stork	<i>Mycteria leucocephala</i>
Black-necked Stork	<i>Ephippiorhynchus asiaticus</i>
Black-headed Ibis	<i>Threskiornis melanocephalus</i>
Lesser Flamingo	<i>Phoeniconaias minor</i>
Cinereous Vulture	<i>Aegypius monachus</i>
Pallid Harrier	<i>Circus macrourus</i>
Red-headed Falcon	<i>Falco chicquera</i>
Great Thick-knee	<i>Esacus recurvirostris</i>
River Tern	<i>Sterna aurantia</i>
European Roller	<i>Coracias garrulus</i>

LAND USE

- Nature conservation and research
- Tourism and recreation
- Urban transport

THREATS AND CONSERVATION ISSUES

- Livestock grazing
- Roadways
- Railway track
- Mining
- Tribal settlements
- Unregulated tourism

Mining of limestone outside the forest is causing habitat destruction on an unprecedented scale. Traffic on a road passing through the area disturbs the wildlife. There are 14 forest settlements of Maldharis, a livestock owning community that lives in the sanctuary. Their increasing population and that of the cattle, and additional cattle that migrate from peripheral villages, exert tremendous grazing pressure on the sanctuary (Singh 2001).

Three rapidly expanding major pilgrimage sites attract thousands of visitors throughout the year, causing immense damage to the area.

KEY CONTRIBUTOR

H.S. Singh

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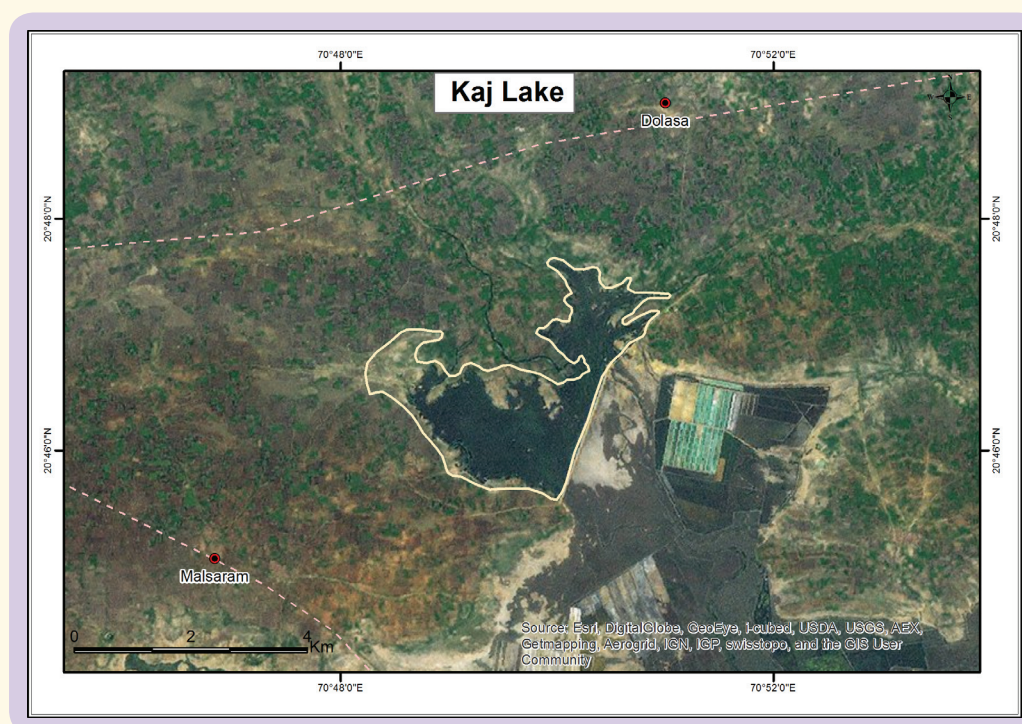
KAJ LAKE (PIPALAVA BANDHARO)

IN-GJ-06

IBA Site Code	: IN-GJ-06	Area	: c. 400 ha
Administrative Region (State)	: Gujarat	Altitude	: 1–1.5 msl
District	: Gir Somnath	Rainfall	: 800 mm
Coordinates	: 20° 48' 38" N, 70° 48' 21" E	Temperature	: 10 °C to 38 °C
Ownership	: State	Biogeographic Zone	: Semi-arid
		Habitat	: Aquatic (Reservoir)

IBA CRITERIA: A1 (Threatened species), A4i ($\geq 1\%$ of biogeographic population)

PROTECTION STATUS: Not officially protected.



GENERAL DESCRIPTION

Kaj Lake is situated 10 km east of Kodinar town in Gir Somnath district. It is a tidal regulatory dam constructed by the Irrigation Department, Government of Gujarat, in 1995. The name of the site on government record is Pipalava Bandharno (*bandharno* = earthen dam erected to harvest rain water).

The lake is bordered by three villages: Nanavada, Pipalava, and Chikhli. The maximum depth of the lake is 2 m. During high tide, particularly on full moon and no moon nights, tidal water from the Arabian Sea touches the dam. Thus, one side of the dam is a large, shallow, freshwater lake with moderate vegetation, and on the other side are tidal mudflats that attract thousands of waterfowl in winter. The maximum water level is seen during July and August, and the minimum during March when the lake is completely dry. As the farmers of surrounding villages draw water to

irrigate their crops from October onwards, the lake almost dries out by the end of February or March. The farmers use diesel engine or submersible water pumps to draw the water. Kaj village is situated c. 8 km from the lake, which is locally known as *Kaj nu Talav*. The main occupation of the villagers is agriculture. Cotton, groundnut, sugarcane, sorghum, maize, and millet are cultivated.

The vegetation cover of this IBA is moderate. *Typha* and *Cyperus* are the common emergent vegetation. The surrounding area has sparse stands of *Prosopis chilensis*. Sedges and grasses are found on the islands and margins of the lake. Scattered shrubs of *Ziziphus* and *Capparis* are also seen in the surrounding area.

Islam & Rahmani (2008) proposed Kaj wetland as a Ramsar Site as it qualifies for Ramsar Criteria 2 (wetland supports threatened ecological communities) and Criteria

VULNERABLE

Greater Spotted Eagle	<i>Clanga clanga</i>
Eastern Imperial Eagle	<i>Aquila heliaca</i>
Dalmatian Pelican	<i>Pelecanus crispus</i>

NEAR THREATENED

Painted Stork	<i>Mycteria leucocephala</i>
Black-necked Stork	<i>Ephippiorhynchus asiaticus</i>
Lesser Flamingo	<i>Phoeniconaias minor</i>
Pallid Harrier	<i>Circus macrourus</i>

Species with high population estimated in 2003

Species	Population in 1% Biogeographic	
	Jan. 2003	Population
Great White Pelican <i>Pelecanus onocrotalus</i>	300	210
Demoiselle Crane <i>Grus virgo</i>	27,120	1,000
Eurasian Spoonbill <i>Platalea leucorodia</i>	500	230
Ruff <i>Philomachus pugnax</i>	1,000	1,000
Black-tailed Godwit <i>Limosa limosa</i>	7,000	1,500

1% population estimates based on Wetlands International (2012)

6 (wetland regularly supports 1% of the individuals in a population of one species or subspecies). According to the Ramsar classification, Kaj can be considered as Type 6 (water storage impoundment).

AVIFAUNA

The wetland regularly harbours more than 20,000 birds during winter, thus it fulfills A4iii criteria. At least two globally Threatened species are seen here every winter, so it also qualifies A4 criteria. Besides this, four Near Threatened species have been seen till now, and more are likely to occur. At least 75 species of birds were observed by Indra Gadhvi (*pers. comm.* 2003).

Wetlands International (2012) has published recent waterbird population estimates. The A4i criteria of BirdLife International (undated) states that any site which has $\geq 1\%$ of the biogeographic population of a congregatory waterbird species could be considered as an IBA. The Kaj Lake easily qualifies this for criteria as it has more than 1% population of five species. The Common Crane *Grus grus* can be mentioned here, although with a maximum number of 675 seen in January, 2003, it does not strictly hold 1% population threshold (Wetlands International estimates 1% population threshold as 700) but Demoiselle Crane *Grus virgo* has almost 27 times more than the 1% population threshold in Kaj.

OTHER KEY FAUNA

There is no mammal of great conservation concern in this IBA. Golden Jackal *Canis aureus*, Jungle Cat *Felis chaus*, Striped Hyaena *Hyaena hyaena*, and Nilgai *Boselaphus tragocamelus* are commonly seen in the area.

LAND USE

- Irrigation
- Agriculture and grazing

THREATS AND CONSERVATION ISSUES

- Draining of water at the peak migratory season
- Invasion by *Prosopis chilensis*
- Grazing
- Poaching

This wetland suffers from the litany of problems that beset other wetlands in India – overgrazing in the catchment area resulting in siltation, spread of invasive species, and drainage of water when bird populations are at their peak in winter. As this is an irrigation reservoir, and the villagers have the right to use water for irrigation, not much can be done. Saurashtra regularly suffers from drought, and it becomes difficult to stop the draining of water, whatever is collected, for irrigation. The welfare of birds always comes second. The only way by which villagers could be persuaded to spare some water for the maintenance of bird habitats is through conservation education and bird related tourism. If the villagers see great benefit accrued to them through tourism, they would be willing to avoid depleting the water resources.

KEY CONTRIBUTOR

I.R. Gadhvi

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KHIJADIYA BIRD SANCTUARY

IN-GJ-07

IBA Site Code	: IN-GJ-07
Administrative Region (State)	: Gujarat
District	: Jamnagar
Coordinates	: 22° 31' 60" N, 70° 09' 00" E
Ownership	: State, Private
Area	: 605 ha (Sanctuary)

Altitude	: 0–2 msl
Rainfall	: 550 mm
Temperature	: 7 °C to 40 °C
Biogeographic Zone	: Semi-arid Coast
Habitats	: Freshwater Swamp, Marsh, Mangroves

IBA CRITERIA: A1 (Threatened species), A4i ($\geq 1\%$ of biogeographic population), A4iii ($\geq 20,000$ waterbirds)

PROTECTION STATUS: Wildlife Sanctuary, established May, 1981.



GENERAL DESCRIPTION

This IBA site consists of a group of three shallow freshwater lakes and extensive marshes adjacent to a large area of salt pans and salt marshes. It lies on the southern shore of the Gulf of Kutch, about 10 km from Jamnagar. Part of the sanctuary was the intertidal zone of the Gulf of Kutch before the construction of reclamation bunds across two creeks to control salinity and to recharge ground water.

It has a dry tropical monsoon climate, with rainfall mainly concentrated in July and August. Habitats in this seasonal inland wetland include shallow freshwater marshes, intertidal mudflats, creeks, salt pans, saline land, and mangroves (Singh 1998). The freshwater marshes dry up in summer, and at high tide, the water of the marsh becomes saline. The wetlands are partly owned by the Forest Department and Revenue Department, and are partly under private ownership.

Khijadiya Bird Sanctuary has both freshwater marshes and intertidal mudflats and marshes (divided by a 5,996 m earthen reclamation bund). The freshwater marsh is covered by thick stands of *Typha angustata* and *Saccharum spontaneum*, while on the bund, *Prosopis chilensis*, *Acacia nilotica*, and *Salvadora* sp. are seen (Singh 1998).

Islam & Rahmani (2008) have proposed Khijadiya Lake as a Ramsar Site as it qualifies for Ramsar Criteria 2 (wetland supports threatened ecological communities), Criteria 5 (wetland regularly supports 20,000 or more waterbirds), and Criteria 6 (wetland regularly supports 1% of the individuals in a population of one species or subspecies). According to the Ramsar classification, Khijadiya can be considered as Type H (intertidal salt marshes, salt pans) and Type 6 (water storage impoundment).

AVIFAUNA

More than 200 species of birds have been recorded from the area (Singh 2001), which is a unique combination of seasonal freshwater wetland and coastal wetland ecosystems. According to the latest checklist (Source: <http://khijadiyabirds.com/sanctuary/check-list-of-birds.html>), 258 species have been recorded. It supports over 90 species of waterfowl and waders, some of which like Great Crested Grebe *Podiceps cristatus* breed here (Singh 2001). The sanctuary is located in the extreme western part of the country and is an important stopover site and wintering ground for migratory birds. Threatened birds include Dalmatian Pelican *Pelecanus crispus* and Indian Skimmer *Rynchops albicollis*.

Vultures have largely disappeared, except for stray records of Red-headed Vulture *Aegypius calvus* and Egyptian Vulture *Neophron percnopterus*.

This site has been designated as an IBA mainly based on congregatory criteria (A4i, A4iii). During years with good rainfall, when the expanse of the freshwater lake is maximum, more than 20,000 ducks and waders are found in this sanctuary. The saline marshes attract thousands of waders such as stints, sandpipers, and plovers. A few threatened species have also been found in Khijadiya. Overall it makes for an excellent IBA.

CRITICALLY ENDANGERED

Red-headed Vulture *Aegypius calvus*

ENDANGERED

Black-bellied Tern *Sterna acuticauda*
Egyptian Vulture *Neophron percnopterus*

VULNERABLE

Dalmatian Pelican *Pelecanus crispus*
Pallas's Fish-eagle *Haliaeetus leucoryphus*
Greater Spotted Eagle *Clanga clanga*
Eastern Imperial Eagle *Aquila heliaca*
Sarus Crane *Grus antigone*
Indian Skimmer *Rynchops albicollis*
Great Knot *Calidris tenuirostris*

NEAR THREATENED

Oriental Darter *Anhinga melanogaster*
Painted Stork *Mycteria leucocephala*
Black-necked Stork *Ephippiorhynchus asiaticus*
Black-headed Ibis *Threskiornis melanocephalus*
Lesser Flamingo *Phoeniconaias minor*
Red-necked Falcon *Falco chicquera*
Ferruginous Duck *Aythya nyroca*
River Tern *Sterna aurantia*
Pallid Harrier *Circus macrourus*
Great Thick-knee *Esacus recurvirostris*
Eurasian Curlew *Numenius arquata*
Black-tailed Godwit *Limosa limosa*
Alexandrine Parakeet *Psittacula eupatria*
European Roller *Coracias garrulus*

Although recent information on species-wise population is not available, based on old information (Scott 1989), Great White Pelican *Pelecanus onocrotalus*, Painted Stork *Mycteria leucocephala*, Black-tailed Godwit *Limosa limosa*, Ruff *Philomachus pugnax*, Common Crane *Grus grus*, and Ferruginous Duck *Aythya nyroca* occur above their 1% biogeographic population thresholds as determined by Wetlands International (2012). There is a sight record of 190 Indian Skimmer *Rynchops albicollis* (Scott 1989), and 76 in March, 2000 (BirdLife International 2001).

The Near Threatened Black-necked Stork *Ephippiorhynchus asiaticus* is regularly seen in Khijadiya. It breeds nearby and is seen in the lake with two or three juveniles almost every year. Several species of waterbirds breed in the area, including Little Grebe *Tachybaptus ruficollis*, Purple Swamphen or Moorhen *Porphyrio porphyrio*, Eurasian Coot *Fulica atra*, Pheasant-tailed Jacana *Hydrophasianus chirurgus*, and Black-winged Stilt *Himantopus himantopus*. At least four pairs of Great Crested Grebe *Podiceps cristatus* bred in 1984, and since then they have been regularly seen breeding.

OTHER KEY FAUNA

The wild mammals of the site include Golden Jackal *Canus aureus*, Jungle Cat *Felis chaus*, Indian Fox *Vulpes bengalensis*, Blue Bull or Nilgai *Boselaphus tragocamelus*, and Common Mongoose *Herpestes edwardsi*. Freshwater turtles are quite common in some parts of the sanctuary.

LAND USE

- Nature conservation and research
- Water management
- Grazing

THREATS AND CONSERVATION ISSUES

- Recurring drought
- Overgrazing
- Increase in salinity
- Disturbance to birds by ship breaking industries
- Infestation of *Prosopis chilensis*
- Overuse of water from wetland by farmers
- Poaching

As the sanctuary lies close to Jamnagar town, anthropogenic disturbance is very high. At the same time, this is a great opportunity to sensitize visitors about the importance of wildlife. Khijadiya also provides interesting habitats which demonstrate the differences in the flora and fauna of freshwater and saline ecosystems.

The exotic invasive shrub *Prosopis chilensis* has colonized most of the terrestrial habitats. In some areas, these thickets are so dense that the wetland is not visible. They could easily be thinned to allow sighting of birds.



DHRITIMAN MUKHERJEE

Khijadiya is unique in the sense that it has freshwater and brackish lakes that attract thousands of waterbirds in winter

The biggest danger to this small sanctuary is from the unauthorized and excessive drainage of water for irrigation that reduces water levels during the peak winter season. Livestock over-grazing is a curse as in most of the sanctuaries of Gujarat, but in the case of Khijadiya limited grazing is beneficial to the freshwater wetland as it removes excessive biomass. A study on the carrying capacity of the wetland for aquatic vegetation would allow us to know how much grazing should be allowed.

Jamnagar is a fast growing town, due to rapid industrialization (at the cost of the Marine National Park, another IBA). Khijadiya, due to its easy accessibility from Jamnagar, could become a major tourist attraction. An interpretation centre on wetlands and waterfowl could be developed at the entrance of the sanctuary. Khijadiya could be an ideal sanctuary for nature education camps and research.

KEY CONTRIBUTORS

H.S. Singh, IBA Team.

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Links

<http://khijadiyabirds.com/sanctuary/check-list-of-birds.html>

MARINE NATIONAL PARK AND WILDLIFE SANCTUARY

IN-GJ-08

IBA Site Code	: IN-GJ-08
Administration Region (State)	: Gujarat
District	: Jamnagar
Coordinates	: 22° 38' 47" N, 70° 00' 53" E
Ownership	: State
Area	: 45,792 ha

Altitude	: 0–21 msl
Rainfall	: 450 mm
Temperature	: 6 °C to 40 °C
Biogeographic Zone	: Coast
Habitats	: Littoral Forest, Riverine Vegetation, Tropical Arid Zone

IBA CRITERIA: A1 (Threatened species), A4i ($\geq 1\%$ of biogeographic population), A4iii ($\geq 20,000$ waterbirds), A4iv (exceeds threshold set for migratory species at bottleneck sites)

PROTECTION STATUS: National Park, established August, 1980.



GENERAL DESCRIPTION

The Marine National Park (16,289 ha) and Sanctuary (29,503 ha) is located in the inter-tidal zone, extending over 170 km along the coast of Jamnagar in the Gulf of Kutch, and includes 42 islands. This is the first protected marine area in India (Singh 2001).

The protected area includes 14,928 ha of islands and 30,864 ha of the coastal zone. A total of 1,071 ha area of the national park and 111 ha area of the sanctuary have been notified as reserve forests, whereas 12,238 ha of the national park and 22,552 ha of the sanctuary are notified under Section 4 of the Indian Forest Act, 1927. Areas of 2,980 ha of the national park and 6,840 ha of the sanctuary have non-forest status, being categorized as territorial waters of India. Another 39,840 ha overlapping area in the park and sanctuary was also notified under the Port Act before 1980

for maritime activities (Singh 2001).

The flora of this IBA includes six species of mangroves, namely *Avicennia officinalis*, *A. marina*, *A. alba*, *Rhizophora mucronata*, *Ceriops candolleana*, and *Aegiceros corniculatum*, 120 species of algae and several species of grasses, shrubs, and herbs. Some other important plant species include *Cyperus* sp., *Suaeda* sp., *Commiphora wightii*, *Salvadora* sp., *Aeluropus logopoides*, *Sporobolus* sp., *Cressa cretica*, and *Capparis* sp. (Singh 2001).

Islam & Rahmani (2008) proposed Marine National Park as a Ramsar Site as it qualifies for Ramsar Criteria 2 (wetland supports threatened ecological communities), Criteria 5 (wetland regularly supports 20,000 or more waterbirds), and Criteria 6 (wetland regularly supports 1% of the individuals in a population of one species or subspecies). According to the Ramsar classification, Marine

NP can be considered as Type A (permanent shallow marine water), Type B (marine subtidal aquatic beds), Type C (coral reefs), and Type D (rocky marine shore). The Government of Gujarat suggested Marine NP as a Ramsar Site in 2012.

AVIFAUNA

A total of 86 waterbirds was recorded in the salt works, and 80 species on the islands and coasts along the Gulf of Kutch (Naik *et al.* 1991). With its long coastline, broad intertidal mudflats, coral reefs, sandy and rocky beaches, Marine NP offers a great diversity of habitats for birds. Immense numbers of migratory birds pass through the park and other parts of the Gulf of Kutch, and a small population of most of the species, mainly juveniles and non-breeding adults, spend the summer here (Naik *et al.* 1991). Marine NP is an important avifaunal region as it borders the Little and Great Ranns (both IBAs) that hold the only breeding populations of Greater *Phoenicopiterus roseus* and Lesser *Phoeniconaias minor* Flamingos, Great White Pelican *Pelecanus onocrotalus*, and Pied Avocet *Recurvirostra avosetta* in the country, and a very large number of both species of flamingos spend most of the year along its coast.

There are 42 islands in Marine National Park, with Pirotan as the star attraction. Some of these islands have colonies of breeding birds such as Painted Stork *Mycteria leucocephala*, Grey Heron *Ardea cinerea*, Great Egret *Casmerodius albus*, Black-crowned Night-heron *Nycticorax nycticorax*, Striated Heron *Butorides striatus*, Black-headed

VULNERABLE

Dalmatian Pelican	<i>Pelecanus crispus</i>
Greater Spotted Eagle	<i>Clanga clanga</i>
Great Knot	<i>Calidris tenuirostris</i>
Indian Skimmer	<i>Rynchops albicollis</i>

NEAR THREATENED

Spot-billed Pelican	<i>Pelecanus philippensis</i>
Oriental Darter	<i>Anhinga melanogaster</i>
Painted Stork	<i>Mycteria leucocephala</i>
Black-necked Stork	<i>Ephippiorhynchus asiaticus</i>
Black-headed Ibis	<i>Threskiornis melanocephalus</i>
Lesser Flamingo	<i>Phoeniconaias minor</i>
Eurasian Curlew	<i>Numenius arquata</i>
Black-tailed Godwit	<i>Limosa limosa</i>

Ibis *Threskiornis melanocephalus*, and Eurasian Spoonbill *Platalea leucorodia* (Naik *et al.* 1991).

Globally Threatened species include the Dalmatian Pelican *Pelecanus crispus*, Greater Spotted Eagle *Clanga clanga*, and Indian Skimmer *Rynchops albicollis*. Much more than 20,000 waterbirds congregate here regularly, so the site fulfils A4iii criteria.

Marine National Park is perhaps one of the few sites which also fulfill A4iv criteria of BirdLife International (undated), i.e., the site is known or thought to exceed thresholds set for migratory species at bottleneck sites. Very large numbers of birds pass through this site, during their onward migration.

OTHER KEY FAUNA

Of the 42 islands, 33 have coral reefs and these, with the



ASAD R. RAHMANI

Marine National Park, as the name indicates, was established on the Saurashtra coast for the protection of extraordinary marine life particularly fish, corals and birds. It is the first marine protected area of India



MRUGANK PRABHU

Sometimes huge congregations of waders are seen in the intertidal zone of Marine National Park

mangroves along the coast and the intertidal areas, support several species of marine biota. Studies carried out by various institutions record 70 species of sponges, 56 species of hard and soft corals, 180 species of fishes, 27 species of prawns, 30 species of crabs, more than 200 species of molluscs, over 12 species of echinoderms, five species of annelids, many species of reptiles including three species of endangered sea turtles, and three species of marine mammals, namely Dugong *Dugong dugon*, Common Dolphin *Delphinus delphis*, and Whale *Physeter catodon* (Singh 1998).

Of all the sightings of Dugong in the Gulf of Kutch, over 50% are from Poshitra Bay in Marine NP. This is mainly due to the availability of seagrass beds, which is considered the main food of this mammal on Ajad, Chank, and other adjoining intertidal areas. The Indo-Pacific Humpback Dolphin *Sousa chinensis* and Bottlenose Dolphin *Tursiops aduncus* are two of the most common marine mammals found throughout the Gujarat coast. The uncommon Black Finless Porpoise *Neophocaena phocaenoides* is also found in Poshitra Bay.

The area under mangrove cover along the Gujarat coast is the second largest on the west coast of India. Of the 960 sq. km of mangrove cover in the state, the Gulf of Kutch region has about 890 sq. km. The notified mangrove forest area is 1,142.5 sq. km (in Kutch and Jamnagar districts together).

Jamnagar district harbours five mangrove species, namely *Avicennia marina*, *A. officinalis*, *Rhizophora mucronata*, *Aegiceros corniculatum*, and *Ceriops tagal* in Marine National Park. In Dwarka, Poshitra, and Dohlani, however, *Avicennia marina* is dominant (Stanley 2004).

The BNHS study under All India Coordinated Project on Taxonomy: Mollusca revealed rich molluscan diversity in the region with 477 species identified so far. Of the 322 species of gastropods identified so far, 187 species are new records (range extensions) to Gujarat state. The project also listed 31 species of opisthobranchs, of which 14 are new records to India.

LAND USE

- Nature conservation and research
- Maritime activities

THREATS AND CONSERVATION ISSUES

- Industrialization
- Urbanization
- Extraction of oil and natural gas
- Grazing
- Unsustainable exploitation of resources

Pollutants from ship breaking yards, ships, offshore oil terminals, discharge from industries and thermal power



Small rocky outcrops with vegetation serve as breeding sites for many bird species such as egrets, storks, spoonbills, and herons

plants, and other pollutants brought in by rivers accumulate in the intertidal area of the sanctuary and national park. The inhabitants of the 56 surrounding villages and other areas fish and collect oysters, snails, and algae from the area. Offshore oil terminals and refineries have been constructed despite opposition from the Forest Department and environmentalists. The Government of Gujarat plans to allow more industries along the coast, after denotifying parts of the national park. This is the most ominous long-term threat to this IBA.

The Gujarat Maritime Board suggested the establishment of a port as a cargo hub for container traffic in Poshitra area which is one of the most important areas for marine biodiversity in Marine National Park. In 2008–2009, the case went to the National Board for Wildlife (NBWL) for approval, where it was rejected after ground survey by experts M.K. Ranjitsinh, Asad R. Rahmani, and Anmol Kumar. However, the threat to revive this plan is still present. Gujarat with its long coastline has the second largest number of ports and harbours after the state of Maharashtra, and 11 greenfield ports are being planned (Lakshmi *et al.* 2012). There is always a threat to revive the Poshitra port.

In 2012, a draft notification by the Union Ministry of Environment and Forests (MoEF) identified 326.26 sq. km around the Marine National Park and Sanctuary as an eco-sensitive zone. The notification would prohibit mining, saw mills, polluting industries, commercial use of firewood, major hydroelectric projects, production of hazardous substances, flying over the area by aircraft or hot-air balloons, and discharge of solid waste and effluents in the eco-sensitive zone, which covers 43 villages located in five

talukas of Jamnagar, Dwarka, Kalyanpur, Khambhaliya, and Jodiya.

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H.S. Singh, Deepak Apte, Asad R. Rahmani.

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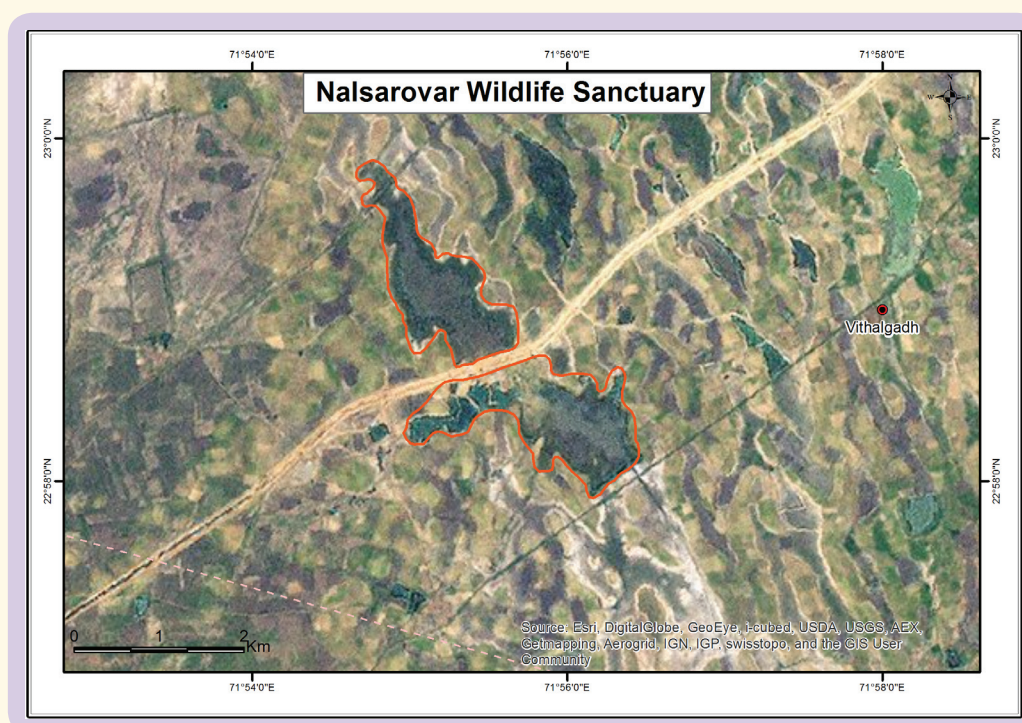
NALSAROVAR WILDLIFE SANCTUARY

IN-GJ-09

IBA Site code	: IN-GJ-09	Area	: 12,082 ha
Administrative Region (State)	: Gujarat	Altitude	: 10–15 msl
Districts	: Ahmedabad, Surendranagar	Rainfall	: 650 mm
Coordinates	: 22° 47' 00" N, 72° 02' 00" E	Temperature	: 6 °C to 43 °C
Ownership	: State, Private	Biogeographic Zone	: Semi-arid
		Habitats	: Aquatic, Seasonal Marsh

IBA CRITERIA: A1 (Threatened species), A4i ($\geq 1\%$ of biogeographic population), A4iii ($\geq 20,000$ waterbirds), A4iv (exceeds threshold set for migratory species at bottleneck sites)

PROTECTION STATUS: Wildlife Sanctuary, established April, 1969.



GENERAL DESCRIPTION

Nalsarovar Wildlife Sanctuary is spread over an area of 12,082 ha and is one of the largest shallow freshwater lakes in India. The sanctuary lies in the semi-arid districts of Ahmedabad and Surendranagar in north Gujarat. The lake has an elliptical basin with a gentle slope. It is very shallow, with a maximum depth of 3 m, and has c. 360 islands scattered in it. The shoreline of the lake is barren and surrounded by dry land and some crop fields (Singh 2001). Nalsarovar is a very popular destination for tourists and birdwatchers.

Nalsarovar is a typical temporary shallow wetland, generally seen in dry areas. About 50 species of algae and more than 72 species of aquatic plants including *Vallisneria*, *Ceratophyllum*, and *Chara* have been recorded from the area (Singh 1998). This vast shallow wetland does not have much

emergent vegetation. In drought years, it remains dry for most of the year.

Islam & Rahmani (2008) proposed Nalsarovar as a Ramsar Site as it qualifies for Ramsar Criteria 2 (wetland supports threatened ecological communities), Criteria 5 (wetland regularly supports 20,000 or more waterbirds), and Criteria 6 (wetland regularly supports 1% of the individuals in a population of one species or subspecies). According to the Ramsar classification, Nalsarovar can be considered as Type P (seasonal/intermittent freshwater lake).

AVIFAUNA

About 250 species of birds have been recorded, of which 158 species are waterbirds. More than 224,000 birds were recorded in 1992, and over 141,000 birds in 1996 in censuses conducted by the Forest Department (Singh

CRITICALLY ENDANGERED

White-rumped Vulture *Gyps bengalensis*

ENDANGERED

Egyptian Vulture *Neophron percnopterus*
Black-bellied Tern *Sterna acuticauda*

VULNERABLE

Marbled Duck *Marmaronetta angustirostris*
Dalmatian Pelican *Pelecanus crispus*
Asian Woollyneck *Ciconia episcopus*
Pallas's Fish-eagle *Haliaeetus leucoryphus*
Greater Spotted Eagle *Clanga clanga*
Eastern Imperial Eagle *Aquila heliaca*
Sarus Crane *Grus antigone*
Indian Skimmer *Rynchops albicollis*

NEAR THREATENED

Oriental Darter *Anhinga melanogaster*
Painted Stork *Mycteria leucocephala*
Black-necked Stork *Ephippiorhynchus asiaticus*
Black-headed Ibis *Threskiornis melanocephalus*
Lesser Flamingo *Phoeniconaias minor*
Ferruginous Duck *Aythya nyroca*
Cinereous Vulture *Aegypius monachus*
Pallid Harrier *Circus macrourus*
Eurasian Curlew *Numenius arquata*
Black-tailed Godwit *Limosa limosa*
River Tern *Sterna aurantia*

2001). Threatened bird species include the Dalmatian Pelican *Pelecanus crispus*, Pallas's Fish-eagle *Haliaeetus leucoryphus*, Indian Skimmer *Rynchops albicollis*, among others. Some common species of birds are the Eurasian Coot *Fulica atra*, Northern Shoveller *Spatula clypeata*, Northern Pintail *Anas acuta*, Eurasian Wigeon *Mareca penelope*, Greater Flamingo *Phoenicopterus roseus*, and Painted Stork *Mycteria leucocephala*.

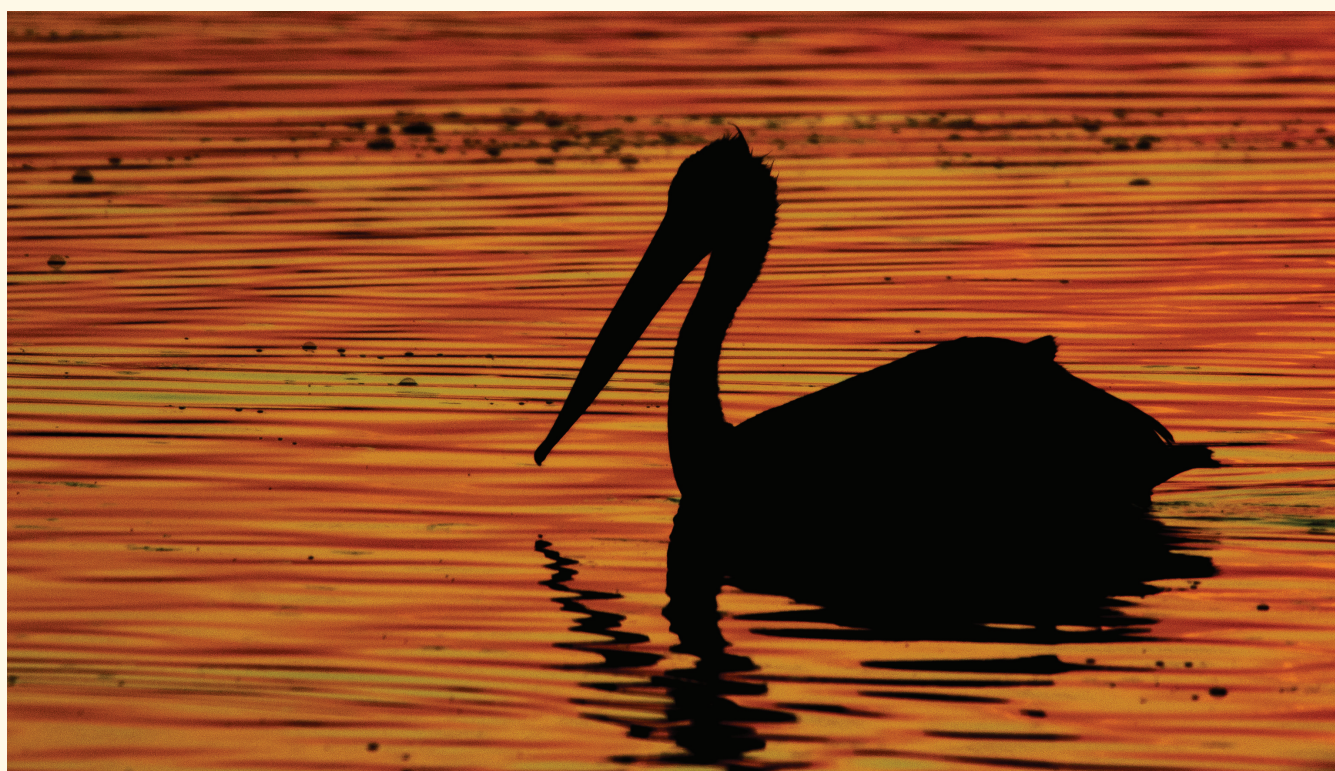
This site has been selected mainly on the basis of congregatory criteria (A4iii), as more than 20,000 waterbirds are found when rainfall is normal. As the area is vast, species-wise population estimates are not easy. Nevertheless, many ducks and waders are found in much larger numbers than their 1% biogeographic population threshold estimated by Wetlands International (2012). As Nalsarovar lies on a migratory route, hundreds of thousands of birds stop over before spreading out in the rest of Gujarat (and other parts of India). Therefore, we have included it under A4iv criteria also, i.e. the site is known or thought to exceed thresholds set for migratory species at bottleneck sites.

There is a recent record of Parasitic Jaeger *Stercorarius parasiticus* from Nalsarovar. Although it is reported from the west coast of India, its presence so far inland is worth noting (Trivedi & Sama 2010). The taxon is now known as Arctic Jaeger.



DHRITMAN MUKHERJEE

Nalsarovar is an extremely popular sanctuary where thousands of visitors come every year to watch birds and for picnics. About 250 species of birds have been recorded till now, of which 158 species are waterbirds



DHRITIMAN MUKHERJEE

Three species of pelican, including the Vulnerable Dalmatian Pelican *Pelecanus crispus*, are found in Nalsarovar

OTHER KEY FAUNA

The sanctuary supports a herd of Asiatic Wild Ass *Equus hemionus* during summer. Grey Wolf *Canis lupus*, Striped Hyaena *Hyaena hyaena*, Golden Jackal *Canis aureus*, Indian Fox *Vulpes bengalensis*, and Jungle Cat *Felis chaus* are also recorded in the area. About 20 species of fish have been recorded from the area (Singh 2001).

LAND USE

- Irrigation
- Waterways
- Fishing
- Tourism and recreation
- Nature conservation and research

THREATS AND CONSERVATION ISSUES

- Fishing
- Trapping and poaching of birds
- Grazing on aquatic grass and algae
- Pumping of water for irrigation
- Tourism pressure and consequent disturbance to birds
- Collection of *Typha*

About 34,000 people live in and around Nalsarovar. All of them depend on the wetland for their livelihood and use it for fishing, livestock grazing, fodder harvesting, cultivation, and tourism-based activities. Some local tribal communities trap and poach waterbirds. Farmers draw water from the wetland.

Due to its proximity to Ahmedabad and other towns, tourism pressure is very high. At the same time, this is an opportunity to sensitize tourists to conservation, especially the importance of wetlands. Most of the tourists come for picnics. A good interpretation centre, educational material in the local language, and presence of knowledgeable guides would help in imparting knowledge on conservation. Guides should be selected from the local villages to provide income to them. Once the villagers know that they can earn money by showing birds to visitors, the incidence of poaching may also be reduced.

KEY CONTRIBUTORS

H.S. Singh, IBA team.

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NALIYA GRASSLAND (KUTCH BUSTARD SANCTUARY)

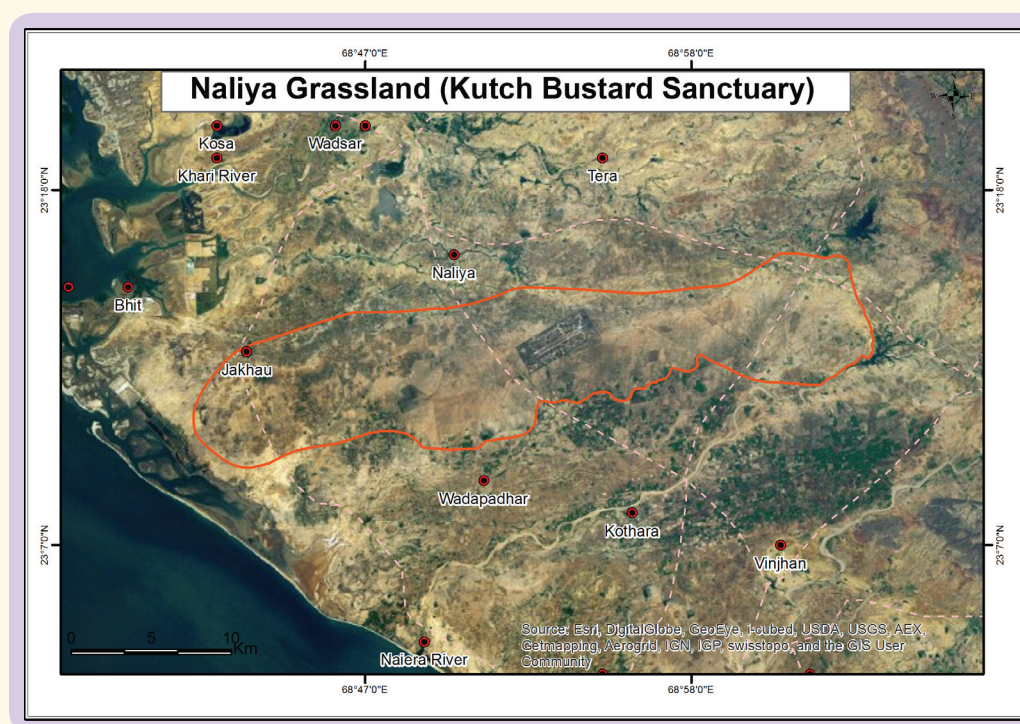
IN-GJ-10

IBA Site Code	: IN-GJ-10
Administrative Region (State)	: Gujarat
District	: Kutch
Coordinates	: 23° 30' 00" N, 68° 45' 00" E
Ownership	: State (Revenue & Forest Department), Private

Area	: 50,000 ha
Altitude	: 15 msl
Rainfall	: 400 mm
Temperature	: 6 °C to 45 °C
Biogeographic Zone	: Desert
Habitat	: Tropical Grassland

IBA CRITERIA: A1 (Threatened species)

PROTECTION STATUS: Partly Wildlife Sanctuary, established in July 1992.



GENERAL DESCRIPTION

More than 40,000 ha area in Abdasa and Mandvi *talukas* of Kutch district constitute one of the finest dry grasslands remaining in Gujarat. In 1992, a small portion (203 ha) of the land falling in Lala and Budiya villages of Abdasa *taluka* was declared as a sanctuary for the Great Indian Bustard *Ardeotis nigriceps*. The site has high conservation value, not only due to the presence of the bustard but also species such as the Lesser Florican *Sypheotides indicus* and Macqueen's Bustard *Chlamydotis macqueenii*. The entire sanctuary is dominated by a single habitat, i.e., grassland with sparse vegetation of bushy *Ziziphus nummularia*. However, in 1990–1991, the Forest Department planted nearly 50 ha of *Prosopis chilensis*, ostensibly to improve the bustard habitat, thus degrading almost 25% of the grassland habitat. Furthermore, the sanctuary is currently surrounded by *Azadirachta indica* plantation, *Prosopis chilensis* thickets,

intensive cultivation, and wind turbines.

Besides the 203 ha Kutch Bustard Sanctuary, the entire belt along the coast line up to 20 km inland used to be covered with grasslands, scrub, and marginal crop fields, ideal for the Great Indian Bustard, Lesser Florican, and other grassland species. These grasslands are now fragmented into patches due to agricultural intensification and development activities. Amongst the most important grassland sites are the Naliya-Vingaber-Parjau *don* (*don* = grassland) and the Kalatalao-Bhachunda-Konathia-Rawa *don* in north Abdasa *taluka*. Some other grassland sites are near Sandhan and Latheri villages in south Abdasa *taluka*, and Changdai-Vamprai and Ratadiya-Bayat villages in Mandvi *taluka*.

AVIFAUNA

This IBA is perhaps the only site in India where three species of bustards (Great Indian Bustard, Macqueen's

DHRITIMAN MUKHERJEE



Naliya grassland is perhaps the second most important breeding area of the Great Indian Bustard *Ardeotis nigriceps* in India. However, even this area is under threat due to extensive land use changes in Kutch

Bustard, and Lesser Florican) are found. Macqueen’s Bustard generally arrive during end October to early November; in some years the three bustards can be seen together, but this is not the usual trend (Sutirtha Dutta, *in litt.* 2014).

This site has the largest known Great Indian Bustard population in Gujarat: around 20 birds are found here (Dutta 2012). During the monsoon of 2000, nine males were seen displaying in Vengaber (Joshua *et al.* 2005), while in 2001, 12 males were found displaying (R.D. Jadeja, *pers. comm.* 2001). However, currently (2007–2014), only two to three males were found displaying in Parjau-Vingaber and

Kalatalao *don* (Dutta 2012). The largest known aggregation of the Endangered Lesser Florican breeds in the grasslands between Lala and Berachia during the monsoon (July–September), and over 60 displaying males have been counted (Sankaran 2000a). When the monsoon was very good in this area and inadequate in other parts of Gujarat, about 120 Lesser Florican were counted in this IBA (R.D. Jadeja, *pers. comm.* 2001). More recently (2007–2010), Lesser Florican densities have been estimated at 0.57–1.33 males/sq. km between low to high rainfall years, indicating that c. 65–150 males breed in these grasslands, depending on local rainfall patterns (Dutta 2012).

Macqueen’s Bustard *Chlamydotis macqueeni* is also seen in winter. Sometimes early arrivals can be seen in the area while the Lesser Florican is still around. The Great Indian Bustard is resident, so it is seen throughout the year.

The Sociable Lapwing *Vanellus gregarius* is listed as Critically Endangered by BirdLife International (2014) as it has a small population that has undergone a rapid reduction, for largely unknown reasons. It breeds just outside the Asian region in the west-central Asian steppes, and winters in northeast Africa, the Middle East, and northern India. There are very few recent records from India. Two birds were seen in a ploughed field close to Lala village in December, 1999, and one bird was photographed near Bhavanipar Dam site,

CRITICALLY ENDANGERED	
Great Indian Bustard	<i>Ardeotis nigriceps</i>
Sociable Lapwing	<i>Vanellus gregarius</i>
ENDANGERED	
Lesser Florican	<i>Sypheotides indicus</i>
VULNERABLE	
Eastern Imperial Eagle	<i>Aquila heliaca</i>
White-browed Bushchat	<i>Saxicola macrorhynchus</i>
Macqueen’s Bustard	<i>Chlamydotis macqueeni</i>
NEAR THREATENED	
Black-necked Stork	<i>Ephippiorhynchus asiaticus</i>

about 10 km from Konathia *Don*, in 2009 by Vivek Kale (Gadhavi *et al.* 2014).

Another Threatened species found in this IBA is White-browed Bushchat *Saxicola macrorhynchus* (R.D. Jadeja, *pers. comm.* 2002) and around 27 birds were seen in 2002–2003 (Justus Joshua, *pers. comm.*). In 2012, about 18 birds were observed in an area of c. 40 sq. km (D.K. Gadhavi, *pers. comm.* 2014).

OTHER KEY FAUNA

The grasslands of Naliya and Kutch Bustard Sanctuary have good populations of Chinkara *Gazella bennettii*. In some parts with good tree cover, Nilgai *Boselaphus tragocamelus* is found. Golden Jackal *Canis aureus*, Indian Fox *Vulpes bengalensis*, and Grey Wolf *Canis lupus* are often seen. Striped Hyaena *Hyaena hyaena* is present in undulating areas of Abdasa and Lakhpat *talukas*, especially in the nearby Narayan Sarovar Chinkara Sanctuary, and depends on livestock carcasses for food (Bopanna 2014). These grasslands also support good populations of the Spiny-tailed Lizard *Saara hardwickii* (Dutta & Jhala 2007), although

these populations are facing decline due to agricultural intensification and poaching in recent years (Dutta 2012).

LAND USE

- Human settlements
- Traditional agriculture (dry farming, livestock herding, intensive cultivation in some areas)
- Tourism and recreation
- Nature conservation and research

THREATS AND CONSERVATION ISSUES

- Encroachment on revenue land for cultivation
- Modernization of cultivation (inorganic, irrigated, mechanized, year-round cultivation replacing traditional practices in some areas)
- Industrialization (solar power and wind power generation).
- High tension power lines
- Infrastructure development (power lines)
- Stray dog population in adjoining settlements
- Invasion by *Prosopis juliflora*



NIRAV BHATT

Wind mills that have come up all around Naliya grassland are a major threat to the survival of Great Indian Bustard



ASHOK CHAUDHARY

Lesser Florican *Sypheotides indicus* is an Endangered species and is found in the Naliya grassland during the breeding season. It is an obligate grassland species for breeding, foraging and other activities

- Plantations of exotic shrub/tree species in grassland (e.g., *Jatropha* and *Azadirachta*)
- Development of ponds as part of watershed management in grasslands
- Overgrazing by livestock
- Unethical nature photography

While Lala Bustard Sanctuary is too small to support any significant numbers of the Great Indian Bustard, the adjoining grasslands, scrub, and crop fields of Naliya-Vengaber-Parjau *don* and Kalatalao-Bhachunda-Konathia-Rawa *don* are ideal habitats for the bustard and florican (Sankaran 2000b, Dutta 2012). Good protection and optimal grassland management would greatly benefit both agropastoralists and wildlife. Sankaran (2000b) proposed optimal management of Naliya-Vengaber-Parjau *don* and Kalatalao-Bhachunda-Konathia-Rawa *don*. Dutta & Jhala (2014) have shown that interspersing some small organic croplands among grasslands and sparing pastures rotationally can benefit a spectrum of grassland species. However, there is a recent trend of agricultural encroachment by the villagers, which needs to be controlled. The majority of this area, being revenue lands, cannot be directly managed by the Forest Department. Following the recommendations of Dutta *et al.* (2013), a proposal to declare this area (c. 150 sq. km) as a Conservation Reserve

to regulate land use is under consideration (Sharma *et al.* 2014). Strategically located Revenue Department lands in Naliya are being acquired by the Forest Department and protected as enclosures to reduce human pressure on bustard and florican (Sharma *et al.* 2014).

There are two private farms within this sanctuary, of which settlement for one has been completed. In September, 2014, an adult female bird died due to collision and electrocution with the heavy transmission lines passing by the sanctuary. Excessive use of pesticide in the nearby agricultural fields is also a threat to the birds breeding in the sanctuary area, especially during monsoon when farming practices at its peak.

The habitat also needs to be protected from invasion by *Prosopis chilensis*, and plantation of exotic shrub/tree species. These activities are not advisable in such grasslands which have very high conservation value. Dense thickets of *Prosopis* are now being removed by the Forest Department from Naliya grasslands, and such practices need to be replicated in the adjoining *Prosopis*-invaded grasslands.

Lala, Naliya, and adjoining grasslands are facing industrial (solar and wind power generation) and infrastructural (power lines) growth that has increased disturbances to birds and mortality of bustards. Recently, bustard deaths have been reported due to collision with power lines. To

reduce such threats, the proposal for declaring this area as a Conservation Reserve needs to be urgently implemented, and effective mitigation measures need to be taken, such as marking power lines or laying them underground to avoid bird collisions.

Stray dogs of adjoining villages, particularly those accompanying agropastoralists inside grasslands, have become an important threat to ground-dwelling birds, perhaps reducing the nesting and chick-rearing success of bustard and florican (Dutta *et al.* 2013).

In an effort to control the dog population in and around Naliya-Vengaber-Parjau *don* and Kalatalao-Bhachunda-Konathia-Rawa *don*, 200 stray and domestic dogs have been neutered with the consent of villagers by Gujarat Forest Department, with professional support from Kutch Ecological Research Centre (D. Gadhvi, *pers comm.* 2014). This was done on a pilot scale, and in the near future it will be implemented on a large scale to ensure the safety of the local communities and bustards.

An additional source of disturbance to breeding bustards in Lala-Naliya grasslands has been unethical nature photography, wherein large numbers of photographers would intrude on displaying birds, reducing their activity time and increasing stress (Dutta 2012). Realizing this, the Gujarat Forest Department has recently banned photography of Great Indian Bustard during the breeding season (Sharma *et al.* 2014).

During the year 2012, KERC (Kutch Ecological Research Centre), a division of The Corbett Foundation, carried out a study in the core-distribution range of the Great Indian Bustard. A patch of land, about 1,475 ha, falling in the wasteland category of the revenue land was identified. This patch was being used by the birds and is contiguous to the existing forest lands. KERC had suggested to the government to merge this patch with the adjoining forest land (c.1454.77 ha) to provide a contiguous patch of habitat to the species.

During the year 2012, 1,593.93 ha of land were handed over to the Forest Department for the conservation of the species. This particular patch of land covers five villages, namely Vingaber, Parjau, Bhanada, Vadapadhar, and Naliya. This particular area was managed and protected by the Forest Department for many years and was also known as Naliya Grassland.

Kutch West Division of Gujarat Forest Department has prepared a species recovery plan as per the guidelines suggested by MoEF. It has the workplan for the next 10 years. Currently, various habitat restoration and protection measures are being implemented by the department to

ensure the survival of the species.

The Corbett Foundation has also developed a video song about the Great Indian Bustard in the local language, the first initiative of its kind. Regular awareness programme in village schools and community centres are being conducted by the Foundation.

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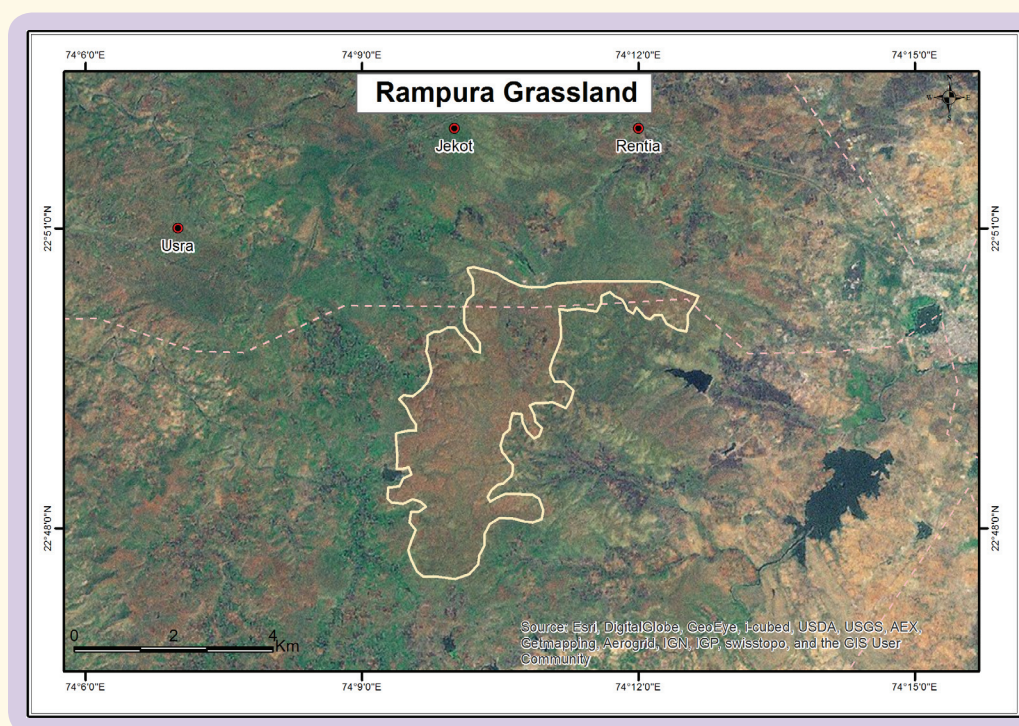
RAMPURA GRASSLAND

IN-GJ-11

IBA Site code	: IN-GJ-11	Area	: 2,000 ha
Administrative Region (State)	: Gujarat	Altitude	: 484 msl
District	: Panchmahals	Rainfall	: 720 mm
Coordinates	: 22° 52' 60" N, 74° 19' 00" E	Temperature	: 13 °C to 42 °C
Ownership	: State	Biogeographic Zone	: Semi-arid
		Habitat	: Tropical Grassland

IBA CRITERIA: A1 (Threatened species)

PROTECTION STATUS: Not officially protected.



GENERAL DESCRIPTION

Rampura grassland is situated near Dahod in Panchmahals district, Gujarat. It lies on the left of the Dahod-Godhra highway, and includes three protected grasslands, namely Kalithalai (859 ha), Muvalia (750 ha), and Rozam (378 ha). Rampura was also known as Kalithalai-Muvalia-Rozam grasslands (Natarajan & Rahmani 1997). The site is situated in the Malwa plateau, an undulating region with valleys and seasonal rainwater streams. It is protected by the Forest Department and used for the production of hay.

This complex of grasslands provides ideal habitats for the Endangered Lesser Florican *Sypheotides indicus*, locally known as *Turrukukde*.

Historically, the whole area, except for some rocky plateaus, was covered with thick Teak *Tectona grandis* forests, the remnants of which are still seen in some valleys. The grasslands came up when these forests were cut over the

years. Important grass species of the site are *Echinochloa colonum*, *Setaria* sp., *Digitaria ciliaris*, *Brachiaria ramosa*, and *Urochloa panicoides* which blooms at the onset of the monsoon (Natarajan & Rahmani 1997). These species are succeeded by *Themeda quadrivalvis*, *Heteropogon contortus*, *Sehima nervosum*, and *Chrysopogon fulvus*. Beside grasslands, plantations of *Acacia nilotica*, *A. tortilis*, *Terminalia crenulata*, *Tectona grandis*, *Bauhinia racemosa*, *Gmelina arborea*, and *Butea monosperma* are also present.

AVIFAUNA

About 140 species of birds are reported from this site (Natarajan & Rahmani 1997). According to Sankaran (1991), 15–20 male Lesser Florican are found in Rampura grassland.

Bird community structure in different types of habitat was studied in Rampura (Natarajan & Rahmani 2002).



Due to extensive tree plantation in the last 10 years, the grassland of Rampura, which harboured 10 to 12 male Lesser Florican, is no longer suitable for this endangered bird

CRITICALLY ENDANGERED

White-rumped Vulture	<i>Gyps bengalensis</i>
Long-billed Vulture	<i>Gyps indicus</i>

ENDANGERED

Lesser Florican	<i>Sypheotides indicus</i>
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VULNERABLE

Sarus Crane	<i>Grus antigone</i>
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NEAR THREATENED

Painted Stork	<i>Mycteria leucocephala</i>
Pallid Harrier	<i>Circus macrourus</i>

Altogether, 68 species were recorded from four study sites. The maximum number of species was recorded in plantations (54), followed by grassland (49), and the least in grazing land (33). The Lesser Florican was seen only in the grassland. Four species of harriers (*Circus* spp.) are also found and use the grassland for foraging and roosting.

BirdLife International (undated) has listed 59 species in Biome 11. In Rampura grassland, we were able to find 18 of these biome species. Most of the species are widespread and common.

OTHER KEY FAUNA

There is no large wild mammal of conservation concern,

but the grassland supports significant populations of smaller mammals such as Indian Fox *Vulpes bengalensis*, Rufous-tailed Hare *Lepus nigricollis ruficaudatus*, and Golden Jackal *Canis aureus*. Among reptiles, the Fan-throated Lizard *Sitana ponticeriana* and Short-tailed Agama *Laudakia* (=Agama) *minor* are common. Indian Monitor *Varanus bengalensis* and five or six species of snakes have been identified.

LAND USE

- Hay production

THREATS AND CONSERVATION ISSUES

- Frequent drought
- Plantations

Rampura grassland demonstrates how hay production could be one of the major land uses of an area where the soil is unfit for other cultivation. There is a full-fledged Range of the State Forest Department in Dahod which protects this grassland and manages harvesting of grass at the right time, storage in godowns, and finally transportation to places where hay is required. The Forest Department strictly protects the grassland during the monsoon when the grass is growing. This is the time when the Lesser Florican breeds, thus it also benefits from the protection.

As the grassland is harvested and the Forest Department has commercial interest in the protection of grasses, Rampura is of vital importance for the long-term survival of the Lesser Florican.

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SALT PANS OF BHAVNAGAR

IN-GJ-12

IBA Site Code	: IN-GJ-12	Area	: 357,540 ha
State	: Gujarat	Altitude	: 0 msl
District	: Bhavnagar	Rainfall	: 800 mm
Coordinates	: 21° 40' 13" N, 72° 15' 20" E	Temperature	: 2 °C to 48 °C
Ownership	: Private	Biogeographic Zone	: Coasts
		Habitats	: Aquatic

IBA CRITERIA: A1 (Threatened species), A4iii (≥20,000 waterbirds)

PROTECTION STATUS: Not officially protected.



GENERAL DESCRIPTION

The district of Bhavnagar lies west of the Gulf of Cambay (Khambhat) in the Kathiawad peninsula in the state of Gujarat. The district used to hold numerous village tanks, estuaries, and streams which were the main habitat for waterbirds, but many such natural habitats have been destroyed or have deteriorated in quality. However, their ecological function is now taken over by salt pans. The saltworks located in Bhavnagar have created an important habitat for wetland birds and are now being used by a great variety of species as a wintering area, which were once used by a few waterfowl (Dharmakumarsinhji 1973). This new habitat serves as an important staging ground for migrant waterbirds moving along the western coast.

Islam & Rahmani (2008) proposed Salt Pans of Bhavnagar as a Ramsar Site as it qualifies for Ramsar Criteria 2 (wetland supports threatened ecological communities),

Criteria 5 (wetland regularly supports 20,000 or more waterbirds), and Criteria 6 (wetland regularly supports 1% of the individuals in a population of one species or subspecies). According to the Ramsar classification, these Salt Pans can be considered as Type G (intertidal mudflats) and Type H (intertidal marshes).

AVIFAUNA

According to Dharmakumarsinhji (1973), Ruddy Shelduck *Tadorna ferruginea*, Common Shelduck *Tadorna tadorna*, Northern Shoveller *Spatula clypeata*, Garganey *Querquedula querquedula*, Northern Pintail *Anas acuta*, Common Teal *A. crecca*, Spot-billed Duck *A. poecilorhyncha*, Gadwall *A. strepera*, and Wigeon *Mareca penelope*, were common in the salt reservoirs of Bhavnagar. Three species of grebe are found in this IBA, Little *Tachybaptus ruficollis*, Black-necked *Podiceps nigricollis*, and Crested *P. cristatus*.

IN-GJ-12



ASAD R. RAHMAN

The saltworks located in Bhavnagar which were once used by a few waterfowl, have become an important habitat for wetland birds and are now being used by a great variety of species as a wintering area

Common Crane *Grus grus* and Demoiselle Crane *G. virgo* are found in winter in very large numbers, sometimes flocks of tens of thousands are seen. Two species of pelicans are found here, sometimes in the same flocks, Great White Pelican *Pelecanus onocrotalus* and Dalmatian Pelican *Pelecanus crispus*. Both are migratory, mainly to western India.

CRITICALLY ENDANGERED

White-rumped Vulture	<i>Gyps bengalensis</i>
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ENDANGERED

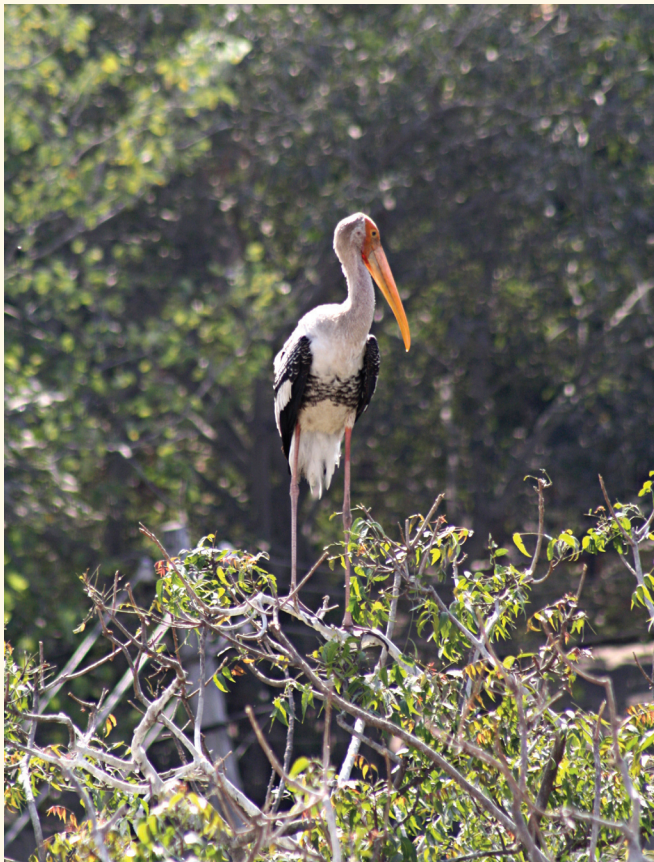
Saker Falcon	<i>Falco cherrug</i>
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VULNERABLE

Dalmatian Pelican	<i>Pelecanus crispus</i>
Eastern Imperial Eagle	<i>Aquila heliaca</i>
Indian Skimmer	<i>Rynchops albicollis</i>

NEAR THREATENED

Oriental Darter	<i>Anhinga melanogaster</i>
Lesser Flamingo	<i>Phoeniconaias minor</i>
Laggar Falcon	<i>Falco jugger</i>
Pallid Harrier	<i>Circus macrourus</i>
Painted Stork	<i>Mycteria leucocephala</i>
Black-headed Ibis	<i>Threskiornis melanocephalus</i>
Eurasian Curlew	<i>Numenius arquata</i>
Black-tailed Godwit	<i>Limosa limosa</i>
Great Thick-knee	<i>Esacus recurvirotris</i>
Eurasian Roller	<i>Coracias garrulus</i>



RAJU KASAMBE

Hundreds of Painted Stork nest inside Bhavnagar city and their main foraging area is this IBA



ASAD R. RAHMANI

Thousands of flamingos are seen outside Bhavnagar and in the salt pans.
Due to their elegant beauty and cultural value, flamingo is rarely killed by the local people

This site has been selected as an IBA based on A1 and A4iii criteria. The salt pans attract hundreds of thousands of small waders, especially species belonging to *Calidris*, *Tringa*, *Limosa*, and *Numenius*. Painted Stork *Mycteria leucocephala*, Black-headed Ibis *Threskiornis melanocephalus*, various egrets, and two species of flamingos also forage in these salt pans and coastal lagoons. Up to 200 individuals of Dalmatian Pelican *Pelecanus crispus* are occasionally seen here.

According to Indra Gadhvi and Dharmakumarsinhji Nature Conservation Society, 161 species of birds have been reported till January 1, 2014.

OTHER KEY FAUNA

These salt pans do not have any significant population of mammals or reptiles. Occasional sighting of jackals and hares are known.

LAND USE

- Saltworks

THREATS AND CONSERVATION ISSUES

- High tension wires
- Disturbance by stray dogs

Tere & Parasharya (2011) conducted a survey of wetlands in Gujarat holding a considerable population of Lesser Flamingo and Greater Flamingo from August, 2002 to December, 2005, during which they recorded flamingo mortality due to collision with electric wires. One Greater Flamingo and one Lesser Flamingo died in Nirma Salt Pans, Bhavnagar, while four Lesser Flamingos died at Kumbharwada, Bhavnagar. Other birds such as Ruff *Philomachus pugnax* and Gull-billed Tern *Gelochelidon nilotica* were also recorded killed at Nirma Salt Pans in Bhavnagar.

KEY CONTRIBUTORS

I.R. Gadhvi, IBA Team.

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THOL LAKE BIRD SANCTUARY

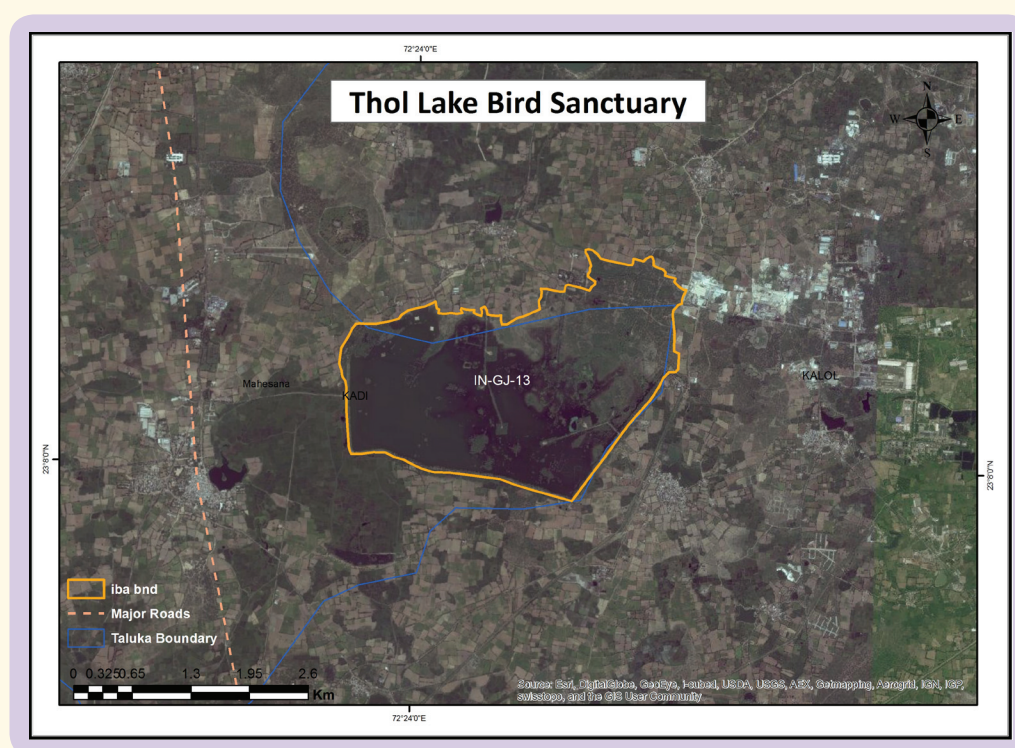
IN-GJ-13

IBA Site Code	: IN-GJ-13
Administrative Region (State)	: Gujarat
District	: Mehsana
Coordinates	: 23° 22' 30" N, 72° 37' 30" E
Ownership	: State

Area	: 700 ha
Altitude	: 20 msl
Rainfall	: 600 mm
Temperature	: 6 °C to 43 °C
Biogeographic Zone	: Semi-arid
Habitats	: Aquatic (Reservoir)

IBA CRITERIA: A1 (Threatened species), A4i (1% of biogeographical population), A4iii (≥20,000 waterbirds)

PROTECTION STATUS: Wildlife Sanctuary, established November, 1988.



GENERAL DESCRIPTION

Thol is an irrigation tank with water storage capacity of 84 million cubic metres. It was constructed in 1912 during the Gaekwad regime to supply irrigation to villagers, thus they have the traditional right to use the water. Earlier, it was a lake, but of late, because of the Sujalam Suphalam irrigation canal, Narmada river water has been released into Thol Lake.

Thol is an open sheet of shallow water of c. 1,450 ha command area, surrounded by cropland. The catchment area is nearly 15,500 ha (Pandit 2001). In 1988, this wetland was declared as Thol Bird Sanctuary. Kadi, the *taluka* headquarters, is just 22 km away from the sanctuary, 25 km northwest of Ahmedabad.

The final settlement of the sanctuary is still pending. At present, it is under the control of two departments, Forest and Irrigation, which creates problems in management.

Thol is an important inland wetland in north Gujarat, and provides excellent habitat for waterfowl during the post-monsoon to winter season. More than 20,000 waterfowl can be seen at the site in winter. The vast open sheet of shallow water and the surrounding crop fields, where the birds are mostly left undisturbed, have created a very conducive habitat for birds. In January, 2012, in a census by the Forest Department, 51,255 birds (less than in 2010) were counted. Thol recorded a large number of ibises, spoonbills, geese, and ducks, which together accounted for more than 50 % of birds found at the lake.

There are emergent and floating aquatic plants, mainly in the vicinity of the wetland. *Acacia nilotica*, *A. leucophloea*, *Ziziphus* sp., *Azadirachta indica*, *Ficus* sp., *Salvadora* sp., *Prosopis chilensis*, and *Capparis* sp. are the important tree species in and around the pond. Some peripheral area has been afforested in recent years (Singh 1998, 2001).

DHIRTIMAN MUKHERJEE



Thol Lake is more than 100 years old and was constructed by the erstwhile Maharaja Baroda of to supply irrigation water to villagers. In 1988 it was declared a bird sanctuary, but the traditional use of water remains with the villagers

CRITICALLY ENDANGERED

White-rumped Vulture	<i>Gyps bengalensis</i>
Long-billed Vulture	<i>Gyps indicus</i>

ENDANGERED

Black-bellied Tern	<i>Sterna acuticauda</i>
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VULNERABLE

Dalmatian Pelican	<i>Pelecanus crispus</i>
Greater Spotted Eagle	<i>Clanga clanga</i>
Sarus Crane	<i>Grus antigone</i>
Indian Skimmer	<i>Rynchops albicollis</i>

NEAR THREATENED

Oriental Darter	<i>Anhinga melanogaster</i>
Painted Stork	<i>Mycteria leucocephala</i>
Black-necked Stork	<i>Ephippiorhynchus asiaticus</i>
Black-headed Ibis	<i>Threskiornis melanocephalus</i>
Lesser Flamingo	<i>Phoeniconaias minor</i>
Ferruginous Duck	<i>Aythya nyroca</i>
Great Thick-knee	<i>Esacus recurvirostris</i>
Black-tailed Godwit	<i>Limosa limosa</i>
River Tern	<i>Sterna aurantia</i>

Islam & Rahmani (2008) proposed Thol Lake Bird Sanctuary as a Ramsar Site as it qualifies for Ramsar Criteria 2 (wetland supports threatened ecological communities), Criteria 4 (wetland provides refuge during adverse conditions to Threatened species), Criteria 5

(wetland regularly supports 20,000 or more waterbirds), and Criteria 6 (wetland regularly supports 1% of the individuals in a population of one species or subspecies). According to the Ramsar classification, Thol Lake can be considered as Type 6 (Water Storage Reservoir). The Forest Department of Gujarat also suggested in 2012 to declare Thol Lake as a Ramsar Site, along with Khijadiya and Marine National Park.

AVIFAUNA

More than 150 species of birds are reported from the sanctuary, of which at least 90 species are waterbirds. The site is important for pre-breeding congregation and nesting of Sarus Crane *Grus antigone*. Gopi Sundar *et al.* (2000) reported 35 Sarus in May, 1998. Thol also supports one of the largest congregations of Ruff *Philomachus pugnax*. Sometimes 5,000–6,000 flamingos congregate in Thol Lake. Thakker (1983) found 70–80 nests of flamingo, presumably Greater Flamingo *Phoenicopterus roseus*, although he does not mention the species. It is not proved whether the flamingos bred there or just made nests and abandoned them, as they do in many other wetlands.

Thol is a very important wintering area for waterfowl. For example, approximately 62,000 birds were estimated in December, 2000 (Singh 2001).

OTHER KEY FAUNA

In the fields surrounding the sanctuary, Blue Bull or Nilgai *Boselaphus tragocamelus*, Striped Hyaena *Hyaena hyaena*, Grey Wolf *Canis lupus*, Golden Jackal *Canis aureus*, and Blackbuck *Antelope cervicapra* are found. In some parts of Mehsana district, Blackbuck has become a major menace to crops, but the people do not hunt these animals. Nilgai is also common and spreading.

LAND USE

- Irrigation
- Industrial use
- Tourism and recreation
- Nature conservation and research

THREATS AND CONSERVATION ISSUES

- Drainage of water for irrigation
- Illegal cultivation
- Excessive use of pesticides in the surrounding paddy croplands
- Rapid industrialization around Thol Lake
- Development of railway freight corridor
- Oil spills

Earlier, withdrawal of water for irrigation was the main conservation issue, but now it appears that rapid industrialization and urbanization may become the major issues. Most of the water of the lake is drawn for irrigation, leaving the waterspread reduced to less than 10 ha during midwinter. Local villagers carry out cultivation within the sanctuary. Although the level of protection against poaching is good, there are difficulties in implementing the provisions of the Wildlife (Protection) Act, 1972, because of the historical use of the water by local people, as well as non-settlement of legal issues related to illegal cultivation and withdrawal of water (Singh 1998). There are seven oil wells in the sanctuary which pump out crude oil and transport it through pipelines. Oil spills around the wells cause pollution.

During the last 10 years, a large number of factories have been established in the Gujarat Industrial Development Corporation (GIDC) premises, 2 km from the bird habitats. Owing to rapid industrialization and increase in human population, land availability is shrinking in the vicinity of the Sarkhej-Gandhinagar highway, and the Ahmedabad Urban Development Area (AUDA) has expanded its

jurisdiction up to Sanand. This, coupled with the rise in land prices adjoining Ahmedabad city, has forced many builders to search for land around Thol. About 150 development projects in Rancharda, Mulasana, Thol, Palodiya, Santej, and other villages within a 10 km radius of Thol Bird Sanctuary have come up. Instead of leaving a 10 km radius as an eco-sensitive zone, as mandated by the Supreme Court, in 2010 the Gujarat Forest Department declared only a one kilometre radius area around Thol as an eco-sensitive zone.

Another danger to the sanctuary is a plan to develop a railway freight corridor c. 700 m from Thol Lake by the Dedicated Freight Corridor Corporation of India Limited (DFCCIL). According to DFCCIL, the project will create additional rail infrastructure to provide an efficient, cost-effective transport system. DFCCIL will significantly reduce freight costs and with the shifting of freight trains onto the Dedicated Freight Corridor, it would generate line capacity for additional passenger trains.

The Forest Department has decided to create Thol Action Group with expert volunteers and local people to develop the lake as a tourist spot.

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H.S. Singh, Asad R. Rahmani, IBA Team.

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VELAVADAR NATIONAL PARK

IN-GJ-14

IBA Site Code : IN-GJ-14

Administrative Region (State) : Gujarat

District : Bhavnagar

Coordinates : 21° 53' 29" N,
71° 59' 56" E

Ownership : State

Area : 3,408 ha

Altitude : 1–6 msl

Rainfall : 550 mm

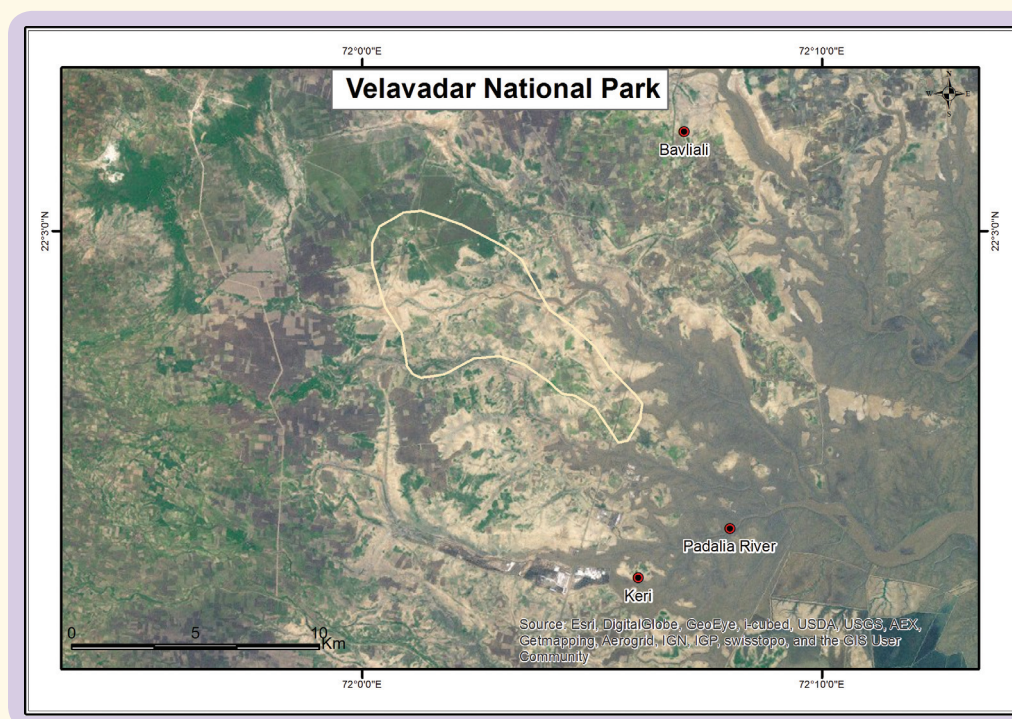
Temperature : 1 °C to 41 °C

Biogeographic Zone : Semi-arid

Habitats : Tropical Grassland

IBA CRITERIA: A1 (Threatened species), A4ii (≥1% of global population of terrestrial species)

PROTECTION STATUS: National Park, established 1973.



GENERAL DESCRIPTION

A tropical grassland, internationally known for its huge concentration of Blackbuck *Antelope cervicapra*, is now famous for the largest population of harriers *Circus* spp. in the world during winter, and also for one of the largest breeding populations of the Lesser Florican *Sypheotides indicus* in monsoon. The existence of a large, regular winter roost of harriers has been known since the mid-1980s, and assessments of the number of birds present at the peak period have ranged up to 2,000 (Clarke 1993).

Velavadar National Park is just above sea level, located 18 km from the Gulf of Cambay and 35 km north of the city of Bhavnagar. Velavadar is at a lower elevation than its surroundings and therefore remains submerged for a longer duration when cyclones strike the coast (Dharmakumarsinhji 1978).

The present area of the national park was a private *vidi* (grassland) of the erstwhile princely state of Bhavnagar (Jhala 1991). This IBA lies in Semi-arid Gujarat-Rajwada Biotic Province of the Semi-Arid Biogeographical Zone, according to the classification of Rodgers *et al.* (2000). The high tidal zone of the Gulf of Khambat (Cambay) constitutes the southern boundary of the park, while wastelands and agricultural fields surround the other sides.

Thirty-nine species of grasses and 46 species of sedges, shrubs, and trees represent the diversity of flora. *Sporobolus virginicus*, *S. coromandelianus*, *S. maderaspatensis*, and *Dicanthium annulatum* are the dominant grasses. *Prosopis chilensis* shrubs cover large areas of the park. Among the medium-sized trees and shrubs, *Salvadora*, *Acacia nilotica*, *Ziziphus*, *Capparis*, and *Suaeda* are common.

CRITICALLY ENDANGERED

Long-billed Vulture	<i>Gyps indicus</i>
White-rumped Vulture	<i>Gyps bengalensis</i>

ENDANGERED

Lesser Florican	<i>Sypheotides indicus</i>
Egyptian Vulture	<i>Neophron percnopterus</i>

VULNERABLE

Asian Woollyneck	<i>Ciconia episcopus</i>
Dalmatian Pelican	<i>Pelecanus crispus</i>
Lesser Adjutant (?)	<i>Leptoptilos javanicus</i>
Greater Spotted Eagle	<i>Clanga clanga</i>
Eastern Imperial Eagle	<i>Aquila heliaca</i>
Sarus Crane	<i>Grus antigone</i>
Macqueen's Bustard	<i>Chlamydotis macqueeni</i>
White-browed Bushchat	<i>Saxicola macrorhynchus</i>

NEAR THREATENED

Oriental Darter	<i>Anhinga melanogaster</i>
Painted Stork	<i>Mycteria leucocephala</i>
Black-headed Ibis	<i>Threskiornis melanocephalus</i>
Pallid Harrier	<i>Circus macrourus</i>
Eurasian Curlew	<i>Numenius arquata</i>
Black-tailed Godwit	<i>Limosa limosa</i>
European Roller	<i>Coracias garrulus</i>

AVIFAUNA

Nearly 190 species of birds have been recorded from this area (Akhtar 1998). The area has been reported as the largest roosting ground in the world for four species of harriers, Western Marsh *Circus aeruginosus*, Montagu's *C. pygargus*, Hen *C. cyaneus*, and Pallid *C. macrourus*, which migrate to the park. It also has the largest concentration of Lesser Florican during the monsoon. Up to 40 territorial male floricans have been found in and around Velavadar

(Anon. undated). Another Threatened bird is the White-browed Bushchat *Saxicola macrorhynchus*, which has been recently confirmed from this site. During winter, Macqueen's Bustard *Chlamydotis macqueeni* is also found in this area in small numbers. Black Stork *Ciconia nigra* and Eurasian White Stork *Ciconia ciconia*, although not in the IUCN Red List, are other interesting species regularly seen.

Earlier, vulture species of the area were very common, but since the last 20 years, they have become extremely rare. Occasionally, White-rumped Vulture *Gyps bengalensis* and Egyptian Vulture *Neophron percnopterus* are seen.

Velavadar has been selected on the basis of A1 criteria (presence of significant numbers of the Endangered Lesser Florican) and A4ii criteria (very high concentration of harriers).

OTHER KEY FAUNA

More than 15 species of mammals (excluding rodents and bats), nine species of reptiles, and several species of insects have been recorded in the park (Dharmakumarsinhji 1978, Natarajan & Rahmani 1997, Singh 2001). Velavadar has one of the largest populations of Blackbuck in India. More than 1,300 were counted in 1988–1989 (Jhala 1991). Grey Wolf *Canis lupus* is the top carnivore in the area. Other animals include Nilgai *Boselaphus tragocamelus*, Golden Jackal *Canis aureus*, Striped Hyaena *Hyaena hyaena*, Jungle Cat *Felis chaus*, and Indian Fox *Vulpes bengalensis*.

LAND USE

- Nature conservation and research
- Agricultural practices



DHRITIMAN MUKHERJEE

Velavadar National Park is one of the finest grassland protected areas in India. Besides the Blackbuck, it has the highest concentration of Lesser Florican. Up to 45 adult territorial florican males have been recorded in 16–20 sq. km area



DHIRTIMAN MUKHERJEE

The well managed grassland of Velavadar used to attract up to 3,000 harriers for night roosting. Due to land use changes and extensive use of pesticides, the population of harriers has declined to one-third of its 1980s numbers

THREATS AND CONSERVATION ISSUES

- Livestock grazing
- Invasion by exotic *Prosopis chilensis*
- Expansion of coastal zone
- Use of pesticides

The growth of *Prosopis chilensis* may attain problematic proportions, if it remains unchecked. Eradication of *Prosopis* is a regular management practice. Blackbuck and Blue Bull feed on *Prosopis* pods in winter and disperse seeds in the park through their droppings. This results in the germination of seedlings, which are removed annually once they become visible in the extensive grass cover. During 1995–2000, *Prosopis* was eradicated from c. 300 ha. Now the grass cover has been extended to more than 1,200 ha.

Poaching is not a very big problem, especially of birds, but the use of pesticide in the surrounding agricultural fields is unregulated and could be having negative impacts on the harriers and floricans, as both feed on insects. This aspect needs to be studied and monitored.

On February 1, 2013, the Centre for Environment Education (CEE), Gujarat Forest Department, and IUCN-India organized a one-day seminar ‘Towards Developing a Multi Stakeholder Strategy for Conservation of Harriers’ during which various recommendations were agreed upon for the long-term protection of harriers in and around Velavadar NP (Anon. 2013).

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Y.V. Jhala, H.S. Singh, I.R. Gadhvi, Asad R. Rahmani.

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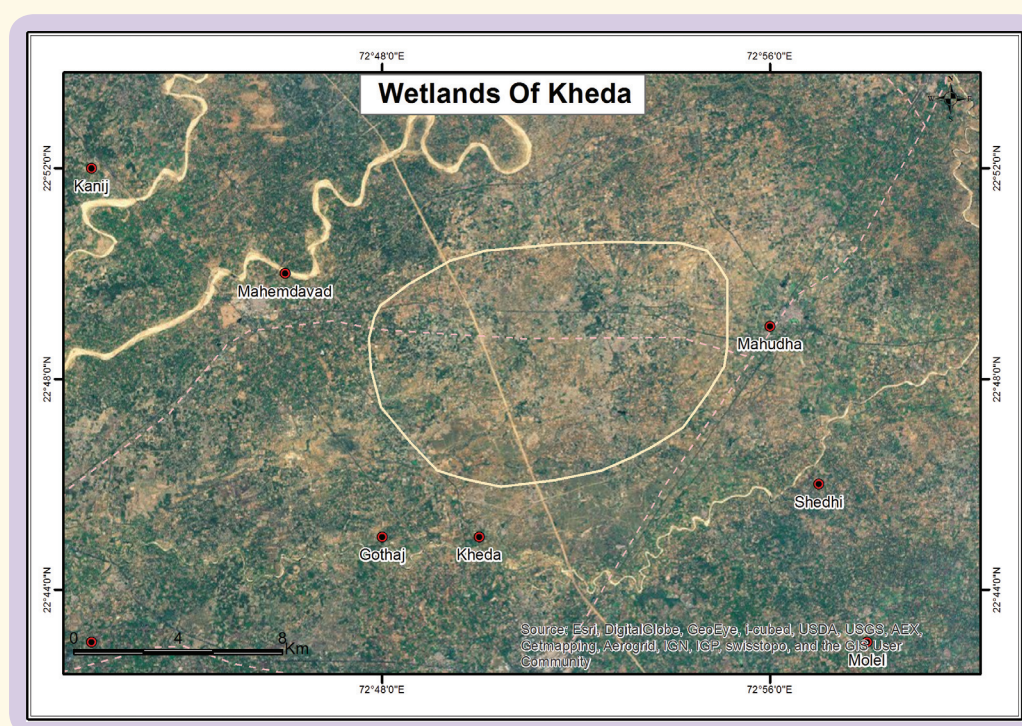
WETLANDS OF KHEDA

IN-GJ-15

IBA Site Code	: IN-GJ-15	Area	: Undefined (total area of Kheda 719,400 ha)
Administrative Region (State)	: Gujarat	Altitude	: Not available
District	: Kheda	Rainfall	: 800 mm
Coordinates	: 22° 40' 30" N, 72° 49' 00" E	Temperature	: 7 °C to 46 °C
Ownership	: State, Private, Community	Biogeographic Zone	: Semi-arid
		Habitats	: Aquatic, Seasonal Marsh

IBA CRITERIA: A1 (Threatened species), A4ii ($\geq$ 1% of global population of terrestrial species)

PROTECTION STATUS: Not officially protected.



GENERAL DESCRIPTION

Kheda district of central Gujarat, situated in western India, occupies 719,400 ha, and is located between two major rivers: Mahisagar on the eastern side and Vatrak, a tributary of River Sabarmati, on the western side. The southern side of Kheda extends to the Gulf of Khambhat. The district mainly comprises flat land, almost at sea level, except for a small area of Kapadvanj and Balasinor *tehsils* which are hilly (Parasharya *et al.* 2000). Most of the district has canal irrigation facilities and therefore irrigated farming is practised. Paddy is extensively cultivated in Kheda district. As paddyfields are temporary wetlands, they provide an alternative to the natural marshland habitat of the Sarus Crane *Grus antigone*. Daloli, Gobrapura, Narda, and Machhial were found to be important roosting areas for these birds (Mukherjee *et al.* 2002). A total of 16 wetlands

have been identified that are important for Sarus Crane, of which two (Matar and Chinor villages) are in poor ecological condition with high biotic pressure, four (Tranga, Narada, Ambaipura, and Pariej-Jalplavit area) are in excellent condition, while the remaining ones (Viroja, Pariej, Hadeva, Alindra, Undhela, Garmala, Palla, Vastana, Khadiyapura, and Heranj) are in good condition.

Islam & Rahmani (2008) proposed Wetlands of Kheda as a Ramsar Site, as it qualifies on the basis of Ramsar Criteria 2 (wetland supports threatened ecological communities) and Criteria 6 (wetland regularly supports 1% of the individuals in a population of one species or subspecies). According to the Ramsar classification, Wetlands of Kheda can be considered as Type O (permanent freshwater lake), Type 3 (irrigated land), Type 4 (seasonal flooded agricultural land), and Type 6 (water reservoir).

AVIFAUNA

The Sarus population of these reservoirs was estimated as follows: 1989 (556 individuals), 1998 (618 individuals), and 2002 (959 individuals) (Mukherjee *et al.* 2002). This site has been selected as an IBA mainly because it has a good breeding population of the globally Threatened Sarus Crane in India. According to Aeshita Mukherjee-Wilske (*pers. comm.* 2014), only 231 Sarus were seen in 2014, almost one-third of the population seen 13 years ago.

A total of 72 bird species have been identified till now, but more are likely to be found.



ASAD R. RAHMANI

As paddyfields are temporary wetlands, they provide an alternative to the natural marshland habitat of the Sarus Crane *Grus antigone*

VULNERABLE

Asian Woollyneck	<i>Ciconia episcopus</i>
Sarus Crane	<i>Grus antigone</i>
Greater Spotted Eagle	<i>Clanga clanga</i>
Indian Skimmer	<i>Rynchops albicollis</i>

NEAR THREATENED

Painted Stork	<i>Mycteria leucocephala</i>
Black-headed Ibis	<i>Threskiornis melanocephalus</i>
Great Thick-knee	<i>Esacus recurvirostris</i>
Eurasian Curlew	<i>Numenius arquata</i>
Black-tailed Godwit	<i>Limosa limosa</i>
River Tern	<i>Sterna aurantia</i>

OTHER KEY FAUNA

As this site is essentially an agricultural area, no large wild mammal is found here. Little is known about other taxa.

LAND USE

- Agriculture

THREATS AND CONSERVATION ISSUES

- Agricultural practices
- Industrialization and urbanization
- Alteration of habitat
- Disturbance to the birds from farming activities

Most of the natural wetlands of Kheda district have been converted to paddyfields, and due to canal irrigation, paddy cultivation has spread into areas which were not cultivated for this crop earlier. Parasharya *et al.* (2000) found a significant positive correlation between the

percentage of land under paddy crop and Sarus Crane density. Although Sarus Crane prefers to breed in non-cultivated marshland in the paddy crop agroecosystem (Borad *et al.* 2001), non-availability of such marshland compels it to breed in standing paddyfields, leading to conflict between the cranes and farmers. To conserve the crane in agricultural landscapes, uniform distribution of such non-cultivated marshland and their maintenance would provide a near-natural habitat for the cranes. This would ensure their successful breeding and reduce conflict with farmers (Borad *et al.* 2001).

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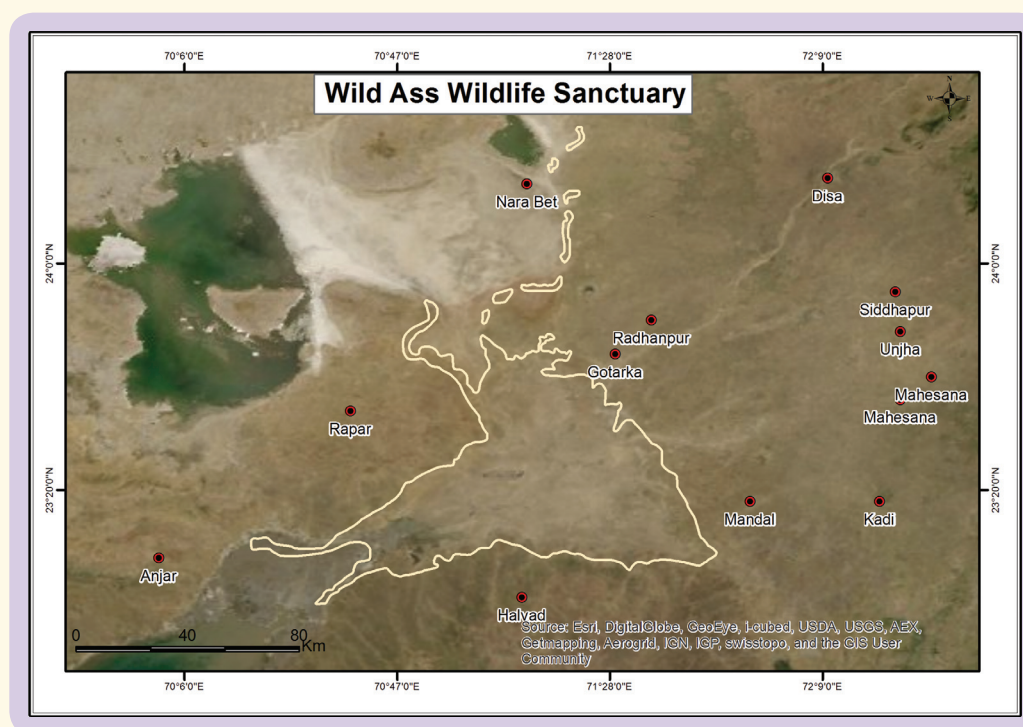
WILD ASS WILDLIFE SANCTUARY & NANDA ISLAND

IN-GJ-16

IBA Site Code	: IN-GJ-16	Altitude	: 3–75 msl
Administrative Region (State)	: Gujarat	Rainfall	: 400 mm
Districts	: Kutch, Rajkot, Mehsana, Banaskantha, Surendranagar	Temperature	: 2 °C to 48 °C
Coordinates	: 23° 42' 31" N, 71° 01' 05" E	Biogeographic Zone	: Desert
Ownership	: State	Habitats	: Tropical Thorn Forest, Tropical Arid Zone, Seasonal Marsh
Area	: 495,371 ha		

IBA CRITERIA: A1 (Threatened species), A3 (Biome 13: Saharo-Sindian Desert), A4i ($\geq 1\%$ of biogeographic population), A4iii ($\geq 20,000$ waterbirds)

PROTECTION STATUS: Wildlife Sanctuary, established November, 1988.



GENERAL DESCRIPTION

The Wild Ass Sanctuary encompasses the Little Rann of Kutch and its peripheral areas in Surendranagar, Rajkot, Mehsana, Banaskantha, and Kutch districts. Of the total area of the sanctuary, 356,900 ha lie in the Little Rann, whereas 138,400 ha grassland is spread over 107 villages of five districts.

The sanctuary area is characterized by vast, salt-impregnated, sun-baked mudflats, which are dotted with small patches of uplands, locally called *beyts* (meaning islands). There are thirty *beyts* of varying sizes, the five best known ones around the edge of the Little Rann are Pung Beyt, Dhut Beyt, Nanda Beyt, Vacharaj Beyt, and Jhilandar Beyt. There are transition zones, or *kala-lana* areas, with

lower salt content. The mudflats remain inundated from the monsoon for about six to seven months of the year, under fresh water received from a few rivers and saline water from the Arabian Sea. Water depth varies from 0.5 m to 1.5 m. The area has scanty, xerophytic vegetation, and the fauna has adapted to the water scarcity and saline habitat conditions.

The saline desert (saline desert-cum-seasonal wetland) of Little Rann of Kutch is believed to have been shallow sea. The variety of geomorphic facets of Kutch, such as the present surface configuration, its landforms, drainage characteristics, and relief pattern, clearly reveals a complex interplay of tectonics, sea-level changes, and lithology, as also erosion and deposition.

The Government of India has proposed the Little Rann of Kutch (LRK) as a Biosphere Reserve. It is a unique habitat, which provides the last abode of the Indian Wild Ass *Equus hemionus khur*, one of the five subspecies of Asiatic Wild Ass.

AVIFAUNA

More than 150 species of birds are reported from the site (Shah *et al.* 1995), which lies in Biome 13 (Saharo-Sindian Desert). BirdLife International (undated) has listed 11 species in this biome, and four of them have been identified till now from this site. As this biome merges with Biome 11 (Indo-Malayan Tropical Dry Zone), 15 species of Biome 11 are also seen. Most of them are widespread and common, and thus not of much conservation concern.

Although the Wild Ass Sanctuary is a vast, flat saline desert, during monsoon it gets inundated and attracts diverse waterbirds. During good rainfall years, in many low-lying areas, water remains till late winter. Vast flocks of ducks and waders are found in these temporary wetlands for brief periods. Their numbers would run to tens of thousands. Important waterbodies are Bajana (Tundi wetland), Nava Talav, South of Wasraj Flamingo nesting ground, Nanda Beyt wetland, Shedwa Beyt, and Surajbari mudflats.

Bajana is located on the eastern fringe of the Wild Ass Sanctuary. It is a monsoon-fed waterbody with seasonal inflow from Banas, Saraswati, and Rupen rivers. Bajana is shallow on the western side, so that side dries up earlier, whereas the eastern and northeastern sides are deeper. It is inhabited by two species of flamingos *Phoenicopterus roseus*

and *Phoeniconaias minor*, Eurasian Coot *Fulica atra*, and other ducks and waders. Huge flocks of Black-tailed Godwit *Limosa limosa*, Pied Avocet *Recurvirostra avosetta*, and Kentish Plover *Charadrius alexandrinus* are found here.

Another waterbody worth noting is Nava Talav. Although it has a natural source of water, this reservoir should be considered a man-made or man-modified wetland (Singh *et al.* 1999). This is because constructing bunds and trapping rainwater run-off have created the wetland. It is owned by Hindustan Salt Works. Huge numbers of waterbirds are found here.

Surajbari mudflats are situated in the western part of the Little Rann of Kutch. The tidal water comes through Hadakiya Creek from the Gulf of Kutch, and flows through anastomosing channels extending 3–4 km into the Rann (Singh *et al.* 1999). Driven by strong winds, the water spreads far into the mudflats where it evaporates, leaving salt encrustations. A large expanse of the tidal mudflats has been converted into salt pans. In recent years, the Lesser Flamingo *Phoeniconaias minor* has been found breeding here.

As part of a comprehensive ecological study of the Wild Ass Sanctuary, birds were monitored fortnightly between November, 1997 and March, 1998. The waterbodies of this sanctuary reportedly supported a total of 80,000 waterbirds (Singh *et al.* 1999).

BirdLife International (2001) has listed the Lesser Flamingo as Near Threatened. Though the global population is about 5,000,000, including about 390,000 in South Asia, declines have been suggested in much of Africa due to



DHRITIMAN MUKHERJEE

Nearly 5,000 sq. km of Wild Ass Sanctuary is located in five districts of Gujarat. Besides providing protection to the Asiatic Wild Ass, it also provides conducive habitat to a large number of birds



DHIRTIMAN MUKHERJEE

The Greater Hoopoe-lark *Alaemon alaudipes* lives in extremely arid areas. In India, it is found in the Thar desert and Rann of Kutch. It is thinly distributed over a vast range extending from India to the whole of Middle East and the Sahara desert

CRITICALLY ENDANGERED

White-rumped Vulture	<i>Gyps bengalensis</i>
Long-billed Vulture	<i>Gyps indicus</i>
Red-headed Vulture	<i>Aegypius calvus</i>

ENDANGERED

Egyptian Vulture	<i>Neophron percnopterus</i>
Lesser Frorican	<i>Sypheotides indicus</i>

VULNERABLE

Dalmatian Pelican	<i>Pelecanus crispus</i>
Greater Spotted Eagle	<i>Clanga clanga</i>
Eastern Imperial Eagle	<i>Aquila heliaca</i>
Sarus Crane	<i>Grus antigone</i>
Indian Skimmer	<i>Rynchops albicollis</i>
Macqueen's Bustard	<i>Chlamydotis macqueeni</i>
White-browed Bushchat	<i>Saxicola macrorhynchus</i>
White-naped Tit	<i>Parus nuchalis</i>

NEAR THREATENED

Oriental Darter	<i>Anhinga melanogaster</i>
Spot-billed Pelican	<i>Pelecanus philippensis</i>
Painted Stork	<i>Mycteria leucocephala</i>
Black-necked Stork	<i>Ephippiorhynchus asiaticus</i>
Black-headed Ibis	<i>Threskiornis melanocephalus</i>
Lesser Flamingo	<i>Phoeniconaias minor</i>
Ferruginous Duck	<i>Aythya nyroca</i>
Cinereous Vulture	<i>Aegypius monachus</i>
Pallid Harrier	<i>Circus macrourus</i>
European Roller	<i>Coracias garrulus</i>
Eurasian Curlew	<i>Numenius arquata</i>
Black-tailed Godwit	<i>Limosa limosa</i>
River Tern	<i>Sterna aurantia</i>

BIOME 13: SAHARO-SINDIAN DESERT

Spotted Sandgrouse	<i>Pterocles senegallus</i>
Greater Hoopoe-lark	<i>Alaemon alaudipes</i>
White-eared Bulbul	<i>Pycnonotus leucotis</i>
Grey Hypocolius	<i>Hypocolius ampelinus</i>

various development projects envisaged in its huge compact breeding colonies. The Wild Ass Sanctuary is an important seasonal foraging and nesting ground for both the Lesser and Greater Flamingo; the inundated Little Rann of Kutch (LRK) has at least 80,000 to 100,000 flamingos foraging (Shah & Qureshi 2013). Singh *et al.* (1999) estimated a population of c. 11,000. In the Greater Rann of Kutch (GRK) (an IBA), Flamingo City located along the Indo-Pak border is purely a Greater Flamingo nesting site, while LRK and Khadir Rann are foraging and nesting sites for both the species (Shah & Qureshi 2013). Greater Flamingo was known to nest only in the Greater Rann (Ali 1974), but local salt pan workers were always aware of the nesting sites of both species in LRK (Shah & Qureshi 2013). According to Wetlands International (2012), the 1% threshold of the South Asian population of Lesser Flamingo is 3,900. With its population of over 80,000 to 100,000, the Wild Ass Sanctuary has almost 25% of the Lesser Flamingos of South Asia. Therefore, it qualifies for A4ii criteria.

Like Lesser Flamingo, the following species also fulfill A4i criteria (1% threshold vis-a-vis total population in this site): Great White Pelican *Pelecanus onocrotalus* (250:1,902), Painted Stork *Mycteria leucocephala* (100:194), Eurasian Spoonbill *Platalea leucorodia* (230:2,561), Greater Flamingo (2,900:5,613), Common Crane *Grus grus* (700:747), Northern Shoveller *Spatula clypeata* (10,000:13,000), Pied Avocet *Recurvirostra avosetta* (1,000:4873), and Black-tailed Godwit *Limosa limosa* (1,000:1,100). Information on the 1% population thresholds is taken from Wetlands International (2012), and on the species population in the Wild Ass Sanctuary from Singh *et al.* (1999).



DHIRTIMAN MUKHERJEE

The Wild Ass Sanctuary has numerous salt pans and seasonal wetlands which attract millions of birds including thousands of flamingos

During a five-year (2002–06) study, Lesser Flamingo were recorded breeding regularly in the Little Rann of Kutch (Parasharya & Tere 2006). Breeding was recorded at two sites, viz. Zinzuwada and Purabcheri of the Wild Ass Sanctuary. On November 17, 2002, a total of 9,259 nests was counted in five different nesting colonies in the salt pans in the central region of Wild Ass Sanctuary, near Zinzuwada. The breeding was successfully completed and flamingos had left the site at the time of the visit. This colony also included old nests, which suggested that they might have nested in 2001 also. Flamingos also attempted nesting at the same site in August, 2003. On September 9, 2003, a total of 8,170 nests was counted in seven different nesting colonies. All the nests were washed out due to flooding of the Rupen river on August 31, 2003. All the eggs were washed away from the nest top and collected in one corner of the salt pans. The colony was destroyed in an early stage of inhabitation.

In 2004, about 4,000 nests were built in a single salt pan but the colony was abandoned for unknown reasons. Similarly, in 2005, about 10,000 nests were made in five different salt pans. The colony was washed out due to floods (Parasharya & Tere 2006). At Purabcheria, 300 nests were observed in 25 different groups during June, 2003.

Lesser Flamingos were recorded breeding regularly on the mudflats of Purabcheria near Cherwari. Altogether 300 nests were observed in 25 different groups during June, 2003. It was an unsuccessful nesting due to pilferage of eggs by the fishermen of nearby villages. On July 2, 2004, a total of 300,000 adult Lesser Flamingo and 52 Greater Flamingo were recorded at the nest site. About 600 Lesser Flamingo were seen building nests. In all, 296 nests were observed in 15 groups, and one egg each was observed in five nests. On July 20, 2004, the number of nests were seen to have increased to 964 in 52 different groups. The number of displaying Lesser Flamingos had decreased and only 79,143

flamingo were recorded. They deserted the colony as the local fishermen collected the eggs. Only 199 nests were counted in 2005. The nests were abandoned due to egg collection and great disturbance by the local fishermen. On June 28, 2006, 1,100 nests and 12,000 adult Lesser Flamingo were recorded at the same site. The majority of birds were displaying. This was an unsuccessful nesting due to pilferage of eggs by the fishermen of nearby villages.

The globally Threatened Sarus Crane *Grus antigone* is also found in this site, but

mostly on the fringes. Shah *et al.* (1995) have seen it in Surendranagar district, and Gopi Sundar *et al.* (2000) saw 10 Sarus at Tundi Talab in May, 1998. A flock of four to six Black-necked Stork were seen in January in Dhut Beyt (Gopi Sundar *et al.* 2006). Shah & Qureshi (2013) noted that 1,000–1,500 Demoiselle Crane forage and roost for a brief period on the Rann grassland.

Some of the *beyts* that are inhabited by terrestrial birds are Pung Beyt, Dhut Beyt, Wasraj Solanki Beyt, Mardak Beyt, and Nanda Beyt. Among all the *beyts*, Pung Beyt is the largest. Macqueen's Bustard *Chlamydotis macqueeni*, Cream-coloured Courser *Cursorius cursor*, White-eared Bulbul *Pycnonotus leucotis*, Hoopoe or Bifasciated Lark *Alaemon alaudipes*, Variable or Pied Wheatear *Oenanthe picata*, and other desert birds are found in these *beyts*.

OTHER KEY FAUNA

About 33 species of mammals, 12 species of snakes, 14 species of lizards, four species of amphibians, and two species of turtles are reported from the sanctuary. Besides the Asiatic Wild Ass *Equus hemionus*, the sanctuary harbours Chinkara *Gazella bennettii*, Collared or Desert Hedgehog *Hemiechinus collaris*, Common Fox *Vulpes bengalensis*, Desert Fox *Vulpes vulpes pusilla*, Grey Wolf *Canis lupus*, Blackbuck *Antelope cervicapra* (on the fringes), Striped Hyaena *Hyaena hyaena*, Nilgai *Boselaphus tragocamelus*, Caracal *Caracal caracal*, and Desert Cat *Felis silvestris* (Singh *et al.* 1999).

LAND USE

- Agriculture
- Nature conservation and research
- Industrial use (salt production)
- Transportation
- Fishing
- Solar and wind mill power generation

THREATS AND CONSERVATION ISSUES

- Ingress of salinity
- Invasion by *Prosopis chilensis*
- Grazing
- Heavy vehicular movement
- Denotification
- Changing micro-habitats due to excess water released from Narmada canal into the Rann
- Development and road projects

The Little Rann of Kutch has been identified by the Government of India as an important site for a Biosphere Reserve. The Biosphere Reserve (638,500 ha) proposed for consideration includes 495,300 ha area of the sanctuary and 143,200 ha of 47 peripheral villages.

Since the launch of the Sardar Sarovar Project in 1987, the Little Rann of Kutch has undergone a dramatic change in its land use practices. Canal water is made available for agriculture, therefore all fallow land is now being cultivated.

In the last 20 years, the ground brine aquifers are depleting, thus the salt works have to explore new brine sources which may be located a few kilometres from the salt pans. The brine has to be pumped and carried through various canal networks criss-crossing the mudflat to reach the pans, which break up habitat continuity. Licenses are being issued to fishermen for fish/prawn harvesting during the monsoon. Rise in livestock grazing is at its peak in the Rann during the wet period. Such pressures lead to conflicts over resource use by livestock and wild species, and when both are in the area, the chances of spreading diseases is also high. With severe anthropogenic pressures on the shrinking habitat within the sanctuary, its future looks bleak.

Surrounding the Wild Ass Sanctuary are 107 villages. These, and villages further away, are dependent on the sanctuary for salt manufacture, grazing, and fishing. More than 35% of the salt produced in India is reported to come from this region. An estimated 40,000 people reside inside the PA, earning their livelihoods through fish/prawn catching (July to August), and salt production and irregularized movement of heavy vehicles for salt transportation (September to mid May).

The sanctuary is being threatened with a proposed plan for denotification of 589 sq. km land specifically for the salt industry, which has fortunately not yet materialized. A petition to this effect has been filed in the Gujarat High Court, seeking clarification on some of the issues concerning the sanctuary, and suggesting a participatory planning and management process for defining an appropriate land use plan for the area. The unique saline mudflats have to be protected from the indiscriminate, unregulated expansion of salt manufacture.

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Nita Shah, Qamar Qureshi, H.S. Singh, the IBA Team.

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BHASKARPARA WETLAND

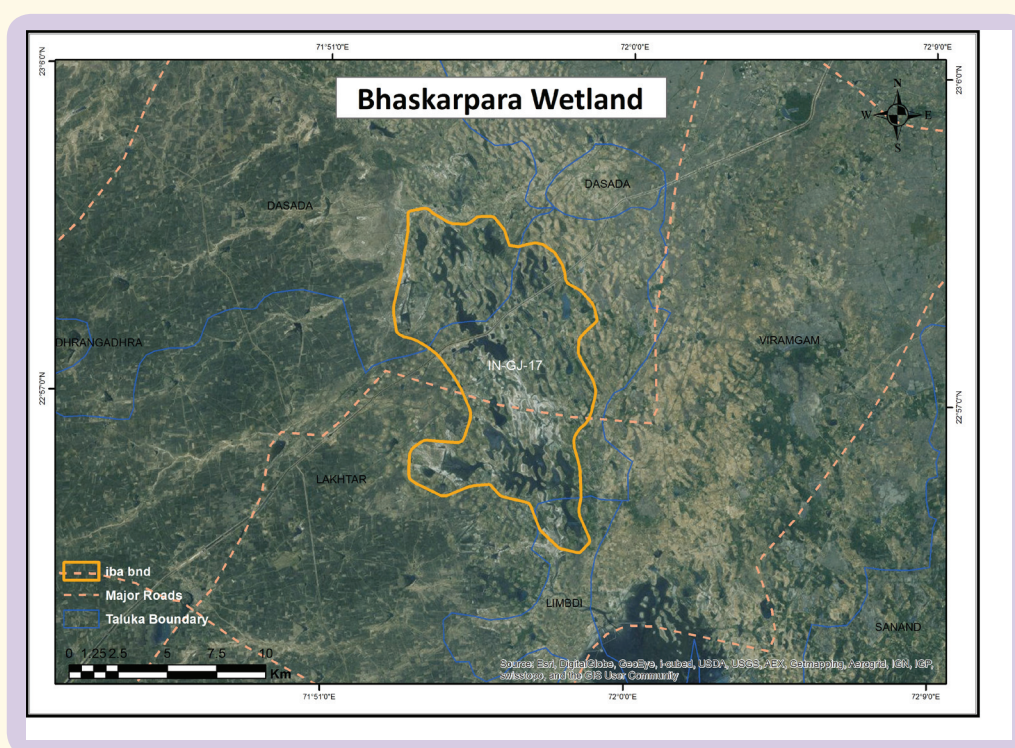
IN-GJ-17

IBA Site Code	: IN-GJ-17
Administrative Region (State)	: Gujarat
District	: Surendranagar
Coordinates	: 22° 55' 33" N, 72° 03' 14" E
Ownership	: State

Area	: c. 1,000 ha
Altitude	: 50 msl
Rainfall	: 500 mm
Temperature	: 5 °C to 48 °C
Biogeographic Zone	: Coast
Habitats	: Aquatic

IBA CRITERIA: A1 (Threatened species), A4iii (≥20,000 waterbirds)

PROTECTION STATUS: Not officially protected.



GENERAL DESCRIPTION

Bhaskarpara wetland, near Narmada Canal, is situated near Vitthalgadh, Surendranagar district, c. 20 km from Viramgam and 45 km from Surendranagar. It is located c. 15 km from Nani Kathechi village, on the western shore of Nal Sarovar Lake (another IBA). The area of this wetland is c. 1,000 ha. It attracts thousands of waterfowl during winter. The wetland is surrounded by agricultural fields and some natural vegetation. As the site is located near Nalsarovar, there is regular exchange of birds between these two IBAs.

Islam & Rahmani (2008) proposed Bhaskarpara as a Ramsar Site as it qualifies for Ramsar Criteria 2 (wetland supports threatened ecological communities) and Criteria 5 (wetland regularly supports 20,000 or more waterbirds). According to the Ramsar classification, Bhaskarpara can be considered Type 6 (water storage impoundment).

AVIFAUNA

Not much is known about the birdlife of this IBA, except that it attracts thousands of cranes, ducks, geese, and waders (Anon. 2007). Several globally Threatened birds are recorded here. The Near Threatened Black-necked Stork *Ephippiorhynchus asiaticus* is seen here. A few pairs of the Vulnerable Sarus Crane *Grus antigone* are sometimes seen. Indian Skimmer *Rynchops albicollis*, listed as Vulnerable, is also seen occasionally.

There is a record of Black Tern *Chlidonias niger* from this wetland, which is perhaps the first confirmed record from Gujarat (Tatu 2010).

We have selected this IBA site on the basis of the presence of Threatened species (A1 criteria) and the presence of more than 20,000 waterbirds (A4iii criteria).



ASAD R. RAHMANI

The Near Threatened Painted Stork *Mycteria leucocephala* is seen in this IBA

OTHER KEY FAUNA

The Asiatic Wild Ass *Equus hemionus* is sometimes seen in the area. Another large mammal, Nilgai *Boselaphus tragocamelus*, is considered a crop pest.

LAND USE

- Irrigation

THREATS AND CONSERVATION ISSUES

- Fishing
- Hunting

As the water is used for irrigation, the wetland dries up in summer. Poaching is not a major problem, but there should be more control on fishing, especially during winter when a large number of migratory birds are present. This can be done with the cooperation of the local people who generally have a benign attitude towards wildlife.

KEY CONTRIBUTORS

Yogendra M. Shah, Chiku Vora, Faruk Chavahan, Vishal Thoria, Prashant Chavda.

CRITICALLY ENDANGERED	
White-rumped Vulture	<i>Gyps bengalensis</i>
VULNERABLE	
Dalmatian Pelican	<i>Pelecanus crispus</i>
Asian Woollyneck	<i>Ciconia episcopus</i>
Sarus Crane	<i>Grus antigone</i>
Indian Skimmer	<i>Rynchops albicollis</i>
NEAR THREATENED	
Oriental Darter	<i>Anhinga melanogaster</i>
Painted Stork	<i>Mycteria leucocephala</i>
Black-necked Stork	<i>Ephippiorhynchus asiaticus</i>
Black-headed Ibis	<i>Threskiornis melanocephalus</i>
Lesser Flamingo	<i>Phoeniconaias minor</i>

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GOSABARA (MOKARSAR) WETLANDS COMPLEX

IBA Site Code : IN-GJ-18

Administrative Region (State) : Gujarat

District : Porbandar

Coordinates : 21° 31' 56" – 21° 41' 37" N,
69° 32' 25" – 69° 50' 39" E

Ownership : State Salinity Control Dept.

Area : c. 9,670 ha

Altitude : 0 msl

Rainfall : 1,000 mm

Temperature : 14 °C to 39 °C

Biogeographic Zone : Coasts

Habitats : Wetland

IN-GJ-18

IBA CRITERIA: A1 (Threatened species), A4iii (Congregation ≥20,000 waterbirds)

PROTECTION STATUS: Forest Reserve. Biodiversity Heritage Site proposed by Gujarat State Biodiversity Board.



GENERAL DESCRIPTION

Among all the wetlands in Porbandar district, Gosabara is the largest, and probably second largest in the state after Nalsarovar (National Wetland Atlas 2010). The wetland is fed by two major rivers, the Bhadar and the Minsar. At the mouths of these rivers, there is a natural depression and waterlogging here is a natural phenomenon.

This wetland, located south-east of Porbandar city, was an intertidal mudflat, where the Arabian Sea ingressed near Gosa village, and sea water could mix with upland runoff collected in depressions during the monsoon. The saline water was not appropriate for agriculture then. This natural lagoon was modified by Salinity Ingress Prevention Cell (SIPC), Gujarat which built structures such as tidal regulators and bunds across the creek. Years of freshwater ingress and tidal control have improved the water quality

in the region, enabling farmers to practice irrigation and increase crop yields. However, on some occasions during high tide, sea water enters the lagoon. In the past, it was very shallow and the extent of water was governed by the tides, but now the intrusion of sea water is controlled by a concrete bund. The saline water enters the western part of the lagoon, and the connectivity is segmented during pre-monsoon season due to salt extraction through saltpans, whereas fresh water enters through two rivers in the north-eastern part of the lagoon. The whole complex of lagoons and freshwater wetlands is also called Mokarsar Wetland Complex by some people. The fauna and flora are mainly freshwater type. The large and shallow waterspread of the wetland attracts a large number and variety of migratory birds. The area has a dry tropical monsoon climate, with rainfall mainly concentrated in July and September.



DHAVAL VARAGIYA

More than 1,00,000 waterbirds are found in Gosabara (Mokarsar) Wetlands Complex

AVIFAUNA

Gosabara is a unique combination of freshwater wetland and coastal wetland ecosystems. Being located on the coast of the Arabian Sea, the avian diversity is high. Almost 200,000 birds of 112 species were counted during January, 2014 (Indira Gadhvi, *pers. comm.* 2014). The lagoon supports more than 100 species of waterfowl and waders, some of which, such as Little Grebe *Tachybaptus ruficollis*, Great Crested Grebe *Podiceps cristatus*, Indian River Tern *Sterna aurantia*, Purple Swamphen *Porphyrio poliocephalus*, Moorhen *Gallinula chloropus*, White-breasted Waterhen *Amaurornis phoenicurus*, Purple Heron *Ardea purpurea*, and Grey Heron *Ardea cinerea* breed here. The wetland is also an important stopover site and wintering ground for migratory birds.

This site has been designated as an IBA mainly based on congregatory criteria (A4iii). During years of good monsoon, when the expanse of the freshwater lake is maximum, more than 100,000 ducks and waders are found in this wetland. The saline marshes attract thousands of waders such as stints, sandpipers, and plovers. Atleast eight Threatened species have also been found in Gosabara. Overall it makes for an excellent IBA. Lesser Flamingo *Phoeniconaias minor* nesting was reported at Chhya village four times, but each time the nests were washed away. Other species that nest here are Oriental Pratincole *Glareola maldivarum* and Kentish Plover *Charadrius alexandrinus*.

OTHER KEY FAUNA

The wild mammals of the site include Jungle Cat *Felis chaus*, Indian Fox *Vulpes bengalensis*, Golden Jackal *Canis aureus*, Blue Bull or Nilgai *Boselaphus tragocamelus*, and Common Mongoose *Herpestes edwardsi*. Barada, a proposed

ENDANGERED	
Saker Falcon	<i>Falco cherrug</i>
Black-bellied Tern	<i>Sterna acuticauda</i>
VULNERABLE	
Asian Woollyneck	<i>Ciconia episcopus</i>
Macqueen's Bustard	<i>Chlamydotis macqueenii</i>
Dalmatian Pelican	<i>Pelecanus crispus</i>
Indian Spotted Eagle	<i>Clanga hastata</i>
Greater Spotted Eagle	<i>Clanga clanga</i>
Sarus Crane	<i>Grus antigone</i>
NEAR THREATENED	
Oriental Darter	<i>Anhinga melanogaster</i>
Ferruginous Duck	<i>Aythya nyroca</i>
Painted Stork	<i>Mycteria leucocephala</i>
Black-necked Stork	<i>Ephippiorhynchus asiaticus</i>
Black-headed Ibis	<i>Threskiornis melanocephalus</i>
Lesser Flamingo	<i>Phoeniconaias minor</i>
Black-tailed Godwit	<i>Limosa limosa</i>
Eurasian Curlew	<i>Numenius arquata</i>
Pallid Harrier	<i>Circus macrourus</i>
Red-headed Falcon	<i>Falco chicquera</i>
Laggar Falcon	<i>Falco jugger</i>
River Tern	<i>Sterna aurantia</i>
European Roller	<i>Coracias garrulus</i>



BHARAT RUGHANI

Many species such as Demoiselle Crane *Grus virgo* are found in greater number than their 1% of population threshold, thus qualifying A4ii criteria

lion reserve, is located 15 km from Gosabara. In 2003, a family of Asiatic Lion *Panthera leo persica* stayed near Gosabara for a few months, and later were shifted to the Gir Sanctuary by the Forest Department. Freshwater turtles are quite common. On the coastal belt near Gosabara wetland, there are reports of nesting of the Vulnerable Olive Ridley Turtle *Lepidochelys olivacea*, Endangered Green Sea-turtle *Chelonia mydas*, and Critically Endangered Hawksbill Sea-turtle *Eretmochelys imbricata*.

LAND USE

- Natural reservoir
- Fishing
- Grazing
- Agriculture on dry margins

THREATS AND CONSERVATION ISSUES

- Water pollution
- Limestone mining
- Fishing
- Poaching

The enormous release of waste water, with high contents of ammonia and inorganic suspended load, is affecting the marine and lagoon diversity of Gosabara. Limestone mining across the region has affected the habitats of many birds and animals. Mining is a threat to the roosting and nesting sites of many birds. High value of fish during October to December induces fishermen to practice net fishing during the winter, when migrating birds are affected by the fishing nets and human disturbance. Migrating cranes and other waterbirds are poached for meat during the winter. The large size of the lake and lack of accessibility makes it hard to prevent poaching in the region.

KEY CONTRIBUTORS

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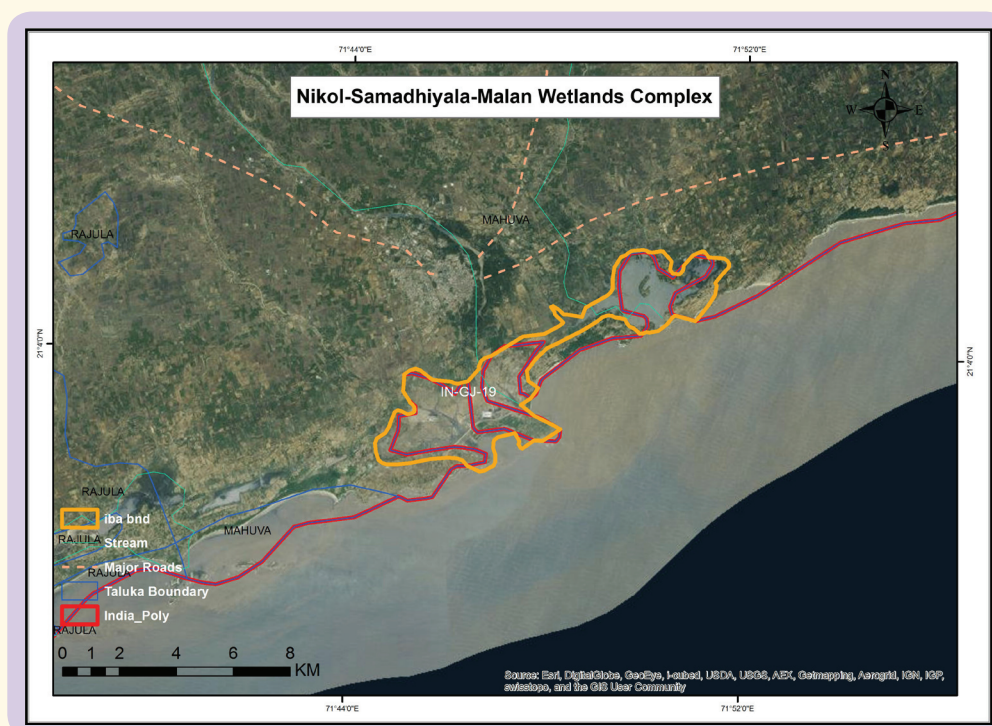
NIKOL-SAMADHIYALA-MALAN WETLANDS COMPLEX

IN-GJ-19

IBA Site Code	: IN-GJ-19	Area	: c. 10 sq. km
Administrative Region (State)	: Gujarat	Altitude	: 0 msl
District	: Bhavnagar	Rainfall	: 517 mm
Coordinates	: 21° 05' N, 71° 45' E	Temperature	: 13° C to 33 °C
Ownership	: State Salinity Control Department	Biogeographic Zone	: Semi-arid
		Habitats	: Marsh

IBA CRITERIA: A1 (Threatened species), A4iii (Congregation ≥20,000 waterbirds)

PROTECTION STATUS: Not officially protected.



GENERAL DESCRIPTION

Taluka Mahuva is known for its mild weather and lush green cropfields, coconut groves, and plantations. Due to its greenery, it is known as the Kashmir of Saurashtra. A decade ago, it was very dry due to the ingress of salinity. Even drinking water was difficult to get, as ground water was saline. In order to prevent the ingress of salinity, the Government of Gujarat constructed bunds on the coast, locally known as *bandharas*. Nikol Bandhara was the first to be established, in 2002, then Samadhiyala and Malan. These *bandharas* helped to prevent salinity ingress and also created reservoirs of fresh water. The local people soon realized the benefit of these waterbodies for drinking water and irrigation, and started supporting the *bandharas*. In order to increase the holding capacity of the *bandharas*, farmers have joined them through water pipes and have voluntarily given their land. One of the important *bandharas* is Samadhiyala in Mahuva taluka. We are proposing the

bandaras from Nikhol to Samadhiyala-Malan as an IBA.

The area is full of thorny vegetation with *Prosopis juliflora*, *Acacia*, and other scrub, and there are common grazing lands.

AVIFAUNA

According to an estimate made during the winter months, approximately 100,000 birds are seen in Samadhiyala, Malan, and Nikol. Two species of Critically Endangered vultures, White-rumped *Gyps bengalensis* and Long-billed *Gyps indicus*, are found in this area. During winter, both the Himalayan Griffon *Gyps himalayensis* and Eurasian Griffon *Gyps fulvus* have been reported to be present. Occasionally, Red-headed Vulture *Aegypius calvus* is seen near Samadhiyala. Egyptian Vulture *Neophron percnopterus* has not been reported to date.

Panrjapoles are traditional animal shelters in Gujarat that tend mostly to cattle. There are two big panrjapoles near

CRITICALLY ENDANGERED

White-rumped Vulture	<i>Gyps bengalensis</i>
Indian Vulture	<i>Gyps indicus</i>
Red-headed Vulture	<i>Aegypius calvus</i>

ENDANGERED

Black-bellied Tern	<i>Sterna acuticauda</i>
--------------------	--------------------------

NEAR THREATENED

Oriental Darter	<i>Anhinga melanogaster</i>
Painted Stork	<i>Mycteria leucocephala</i>
Black-necked Stork	<i>Ephippiorhynchus asiaticus</i>
Black-headed Ibis	<i>Threskiomis melanocephalus</i>
Lesser Flamingo	<i>Phoeniconaias minor</i>
Himalayan Griffon	<i>Gyps himalayensis</i>
Black-tailed Godwit	<i>Limosa limosa</i>

Mahuva: Kalyanji Anandji Trust Panjrapole and Girivihar Panjrapole. The total cattle population tended by these two shelters is estimated at 5,000 old individuals, and mortality is between 15 to 20 cattle per day. This provides enough diclofenac-free food for the vulture feeding centre that is maintained in the area. During 2010–2011, the feeding site was managed by Ruchi Dave with the help of WWF Small Grants. She also provides the non-toxic NSAID Meloxicam to the panjrapoles with the help of Nature Club Surat. Currently, the feeding site is being managed by the local people and the panjrapole authorities.

Apart from vultures, there are c. 5,000 Black-tailed Godwit *Limosa limosa*, a Near Threatened wader in the wetlands in this IBA. Eurasian Spoonbill *Platalea*

leucorodia, on the decline in many wetlands, are also present in numbers touching 1,500 in Samadhiyala wetlands. A huge heronry of egrets, Eurasian Spoonbill, Painted Stork *Mycteria leucocephala*, and a few other species, is also present in the area. More than 300 nests of Painted Stork were reported from Nikol in 2012–2013 (Ruchi Dave, *pers. comm.* 2014). Altogether, nearly 80 bird species have been identified till now in the three *bandharas*. On July 3, 2003 a Blue-footed Booby *Sula nabouxi* was rescued from the Samadhiyala *bandhara*. The bird did not survive, and the preserved carcass was sent to BNHS. On August 9, 2014, a Masked Booby *Sula dactylatra* was rescued from the same place. This also died, and the preserved carcass was sent to the Department of Zoology, Science College of Mahuva.

OTHER KEY FAUNA

Mammalian fauna of the area includes ungulates such as Blackbuck *Antelope cervicapra*, Blue Bull *Boselaphus tragocamelus*, Chinkara *Gazella bennettii*, and Cheetal *Axis axis*. Feral cows are also present in large numbers in the area. These ungulates form the prey base of the Asiatic Lion *Panthera leo persica*. According to the latest census, one female and her three young are present in the area within Doliya – where Nirma Ltd wants to set up a cement factory. Mahuva range has a total population of c. 30 lions. Indian Wolf *Canis lupus*, Indian Fox *Vulpes bengalensis*, Striped Hyaena *Hyaena hyaena*, Jungle Cat *Felis chaus*, and Indian Crested Porcupine *Hystrix indica* are also reported to be present.



AKSHAY KANAKIYA

In the large complex of Samadhiyala, Malan and Nikol wetlands more than 100,000 birds are found in winter. Even in summer 20-25,000 thousand birds can be seen when the water in other wetlands dries up



DHAVAL VARAGIYA

This IBA complex is a major wintering area for Greater and Lesser Flamingos

On an average, 10–18 nests of sea turtles are reported each year at Nikol, though none were reported in 2013 (Ruchi Dave, *pers. comm.* 2014).

LAND USE

Irrigation

THREATS AND CONSERVATION ISSUES

The proposed cement plant in Samadhiyala and limestone mining nearby will have a devastating effect on irrigation, agricultural land, ecology, and biodiversity of the site. The cement plant will adversely affect irrigation, ruin the waterbody, and destroy the water regime – the very purpose of Samadhiyala. The reservoir that was completed in 2000 has been a boon for farmers and for thousands of migratory birds. Approximately 14,000 farmers from 15 villages in Mahuva *taluka* have been running a campaign to prevent the Gujarat government from giving fertile farm land in their region to Nirma Ltd to build a cement plant. Their protest began to take shape in 2008 when the government allotted Nirma the land to build the plant. The nonviolent movement involved a 500 km march to Gandhinagar, in which thousands of farmers took part to protest against the construction of the plant. The villagers in their battle against the government have faced fines and police detention during their agitation. The Ministry of Environment and Forests

has revoked the environmental clearance given to Nirma in December 2011, stating that “No freshwater sanctuary needs to be razed to pitch a cement plant.” Currently the matter is being heard by the National Green Tribunal and the project has been stayed.

It may be emphasized that the construction of this cement plant and limestone mining project will not only destroy hectares of ecologically sensitive area but will also adversely affect the lives of thousands of farmers dependent on agriculture for their survival.

KEY CONTRIBUTORS

Forest Department (Mahuva Range), Flamingo Nature Club Mahuva, Ruchi Dave.

Links

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